SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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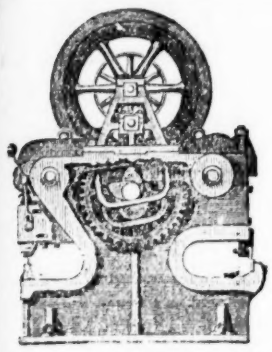

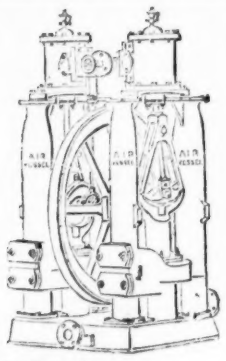

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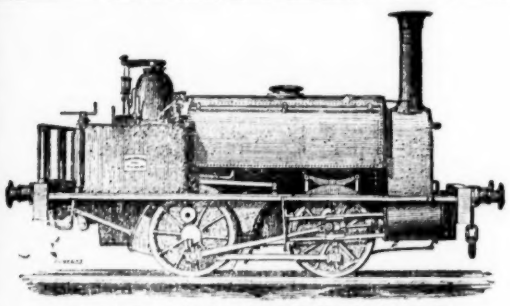

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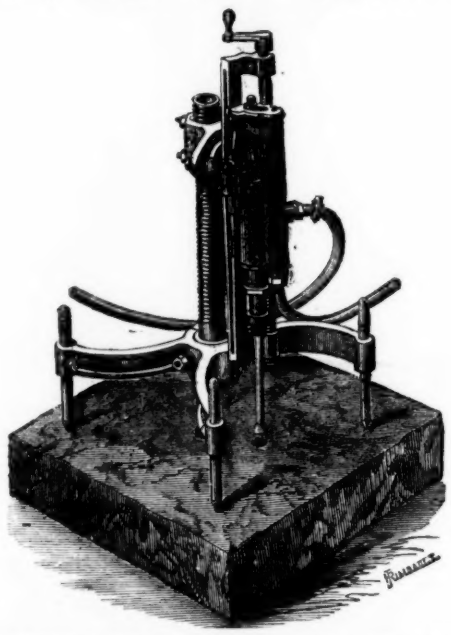

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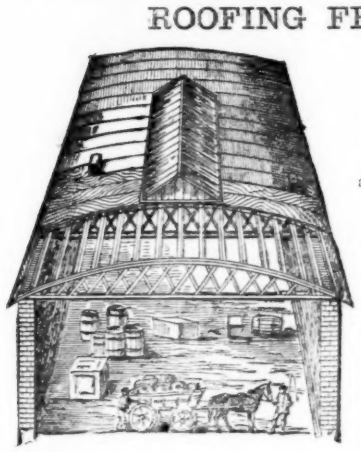

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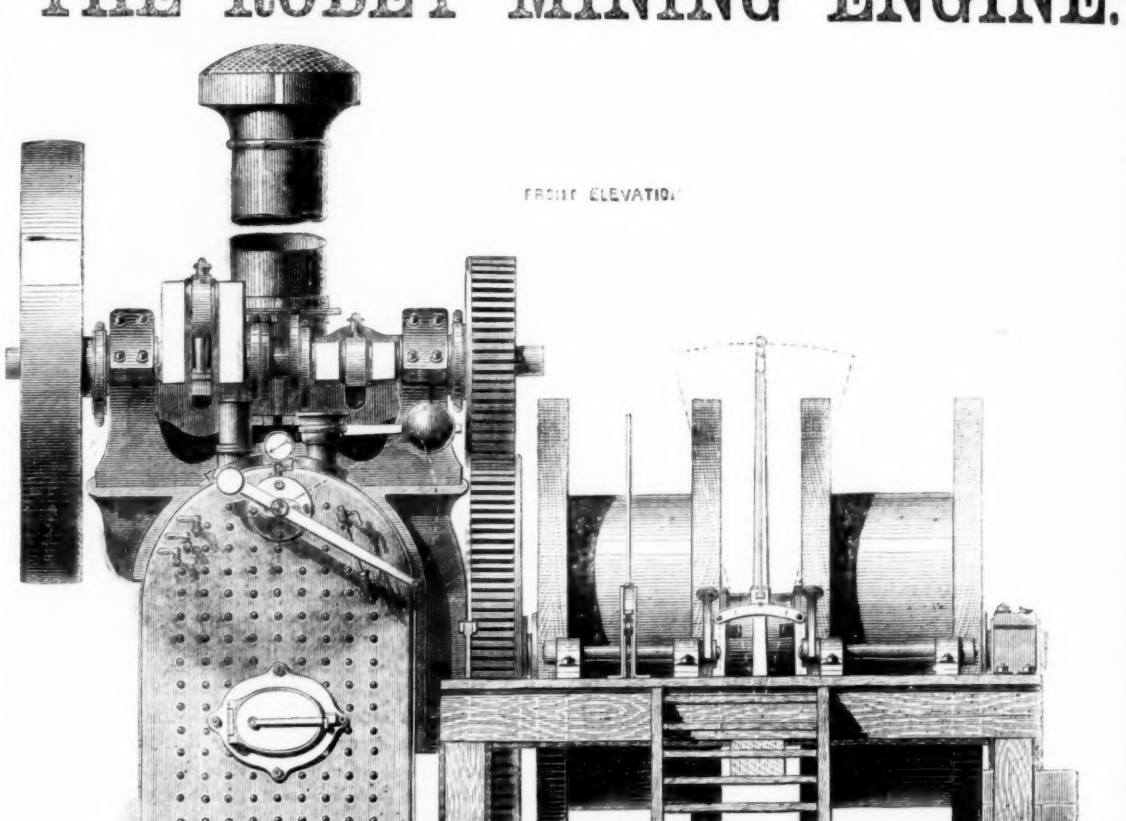

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GOVERNMENT MINING SCHOOLS IN AMERICA.

SCHOOL OF MINES STUDENTS V. "EXPERTS."

SIR,—I have during the past year read the *Mining Journal* with attention, and deplore, as much as it can be deplored in England, the language of some of the American experts who have been over zealous in their efforts to attract capital in this direction, but I beg you to believe that there are in America some mining engineers as capable as they are honest, and as trustworthy as they are incorruptible. The agitation now going on for the establishment by Congress of a Mining Bureau and a Government School of Mining affords some promise that hereafter we shall have a better class of mining engineers, and that capitalists will, consequently, have some better basis for forming a judgment as to what properties are worthy of their support. It is very truly remarked that the ores of each new mining district, and often of contiguous mines in the same district, are different from each other in ever-varying chemical combinations: and to learn the most economical mode of thoroughly eliminating the precious metals requires patient, careful, and costly experiments. Private fortunes are sunk in isolated efforts, in a thousand different mining districts, to build smelting and reducing works. These experiments, all tending to eventual success, stop short of it for the want of capital, of unity of action, and of full knowledge of the means in successful use in other parts of the world. The pioneer who sinks the fortunes of himself and friends in unsuccessful mills occasionally sees a successor profiting by his failure, and reaping the fruits of his sacrifices. Oftener, however, the first failures discourage further experiments, and postpone indefinitely the development of rich mineral districts. As it is considered that there is here a vast field for wise assistance by the General Government in the development of this mining wealth, it is suggested in a memorial to Congress that there should be established and endowed a Mining Bureau, not only to collect every kind of information of a practical or scientific character pertaining to the mining and reduction of the precious metals, but also, in addition, with the best experience of the mining regions at his service, to establish and maintain experimental mills at the most promising new centres of ore production; and, further, to establish Government Schools of Mining in connection with such Mining Bureau. Now, as this would give us a better class of mine inspectors, and facilitate the obtaining of really reliable reports, I believe that the British capitalist would derive the utmost possible benefit from the suggestion being carried out.

Here in Utah we are no doubt all agreed that our mining industry wants Government care, fostering, and encouragement, but to what extent? Shall Government have schools? Shall it have the mines administered by its own engineers? Shall it erect reduction works? Or, lastly, shall it own mines, those acquired by purchase having been duly appraised? On the whole, without blindly patterning after the Old World, and without trying to introduce into our quite original system features which have been successful somewhere else, yet I believe that the regime followed in the continental mining districts of Europe, of France and Germany especially, is worthy of the closest study and emulation. In France and Germany Government does not own any mines (with the exception of those of salt). In Germany it owns all the reduction works. These being managed by the highest skill, and owned by the greatest concentration of capital, can afford to pay better prices for the ore than private concerns. The ore is sold from duplicate assays, made respectively by the purchaser and the mine owners. But the profits from smelting, which are handsome, do not flow indiscriminately into the treasury. Fully one-fourth is expended in improvements bestowed on the mining "Revier," from which the profits are derived. A considerable share goes to the mining academy of the district (Clausthal or Freiberg respectively) in collections, library, maintenance of buildings, and salaries of teachers. A larger portion is expended on improvements calculated to benefit the mines, such as the construction of ditches, canals, tanks, or reservoirs for the enormous wheels and "stollens," or drainage tunnels—all improvements which, without benefiting any single mine, will redound to the advantage of all. Thus the famous Rothschoenberger Stollen, an undertaking similar to our Sutro Tunnel, and intended to drain the mines from their deepest available point, is a Government undertaking—its construction having exceeded the capabilities of the individual mine owners. After its completion Government will charge but a moderate rental for its use, probably barely enough to defray current expenses.

In the Harz Government is doing precisely the same thing. But all the internal improvements on the respective claims, such as for sinking, prospect work, drainage, hoisting, &c., must be borne by the miners or mining companies themselves. The academies are Government schools; none but those pupils who have passed satisfactory examinations before the board of Government Inspectors are allowed to officiate in any of the mines. Quarterly, or sometimes even monthly, reports must be sent to the board, accompanied by diagrams showing the progress in the mines; besides, the mines are regularly inspected by Government commissioners. And, lastly, a good share of the profits is applied to new processes for the reduction of ores, improvements in concentration, new inventions in the way of hoisting, ventilating, or pumping machinery.

It is evident, therefore, that the mining districts in Germany are not in the possession of the Government, but under its tutelage and supervision, benefitted and supported, but at the same time strictly watched and checked. This is as it should be. Government has a right to see that its appropriations for the benefit of the community are not misdirected and wasted; and it has a duty, on the other hand, to see that its staple industries be encouraged and supported. The proviso of adapting a portion of the profits realised to experiments in mining and smelting is an admirable one. No one but an inventor knows the apathy and lethargy of individual mine owners and manufacturers, the difficulty with which they will step out of their groove, and the impossibility in which they are only too often for introducing new features in their establishments. In allotting a share for such purposes Government has well deserved *bene meruit* for science at large, for industry and the arts. The world swarms with *bone et mala fide* inventors for new processes, manufacturing, smelting, and milling improvements; some are good, a great many worthless; how to discriminate would be impossible even for the wealthiest and most liberal manufacturer. Here, then, Government steps in; here is its true sphere; with a wise and fatherly hand it takes up all the plans, separates the chaff from the grain, and aided by the highest intelligence, by the most tried skill in the State, it judges on the last instance of the worth or worthlessness of the improvements proposed. This is a priceless boon, and one which ought to be specially appreciated by Americans, many of whom have sunk such large fortunes in different portions of the West in trying to find new and advantageous processes for their rebellious ores.

In France the system is pretty much the same, with the exception that the mines need not be (they can) directed by Government engineers, and that the reduction works are mostly in the hands of private companies, but Government has its schools—the famous Ecole des Mines, at Paris—the graduates of which are commissioned Government engineers, with the duty of examining and reporting on all the mines worked in the State. They are the parties entrusted with the health and security of the workmen employed, and with the enforcement of Government regulations in regard to mining; but whether the Government in France has provided for works of general utility, as is the case in Germany, I am not prepared to say.

On the whole, it would appear that the reproduction of the German system in its main features, would be the most beneficial for this country, still reserving the right of introducing such features as might be suggested by the study of the English, Austrian, and Scandinavian systems. The statute for admitting none but pupils of the Government schools into the mines need not be enforced during the period of transition. Hoping that the development of some such project may, to the satisfaction of British capitalists, remove the stigma which has too often attached to the name of American Mining Engineer, I do not doubt that it will be equally beneficial to the mineral interests of Utah.

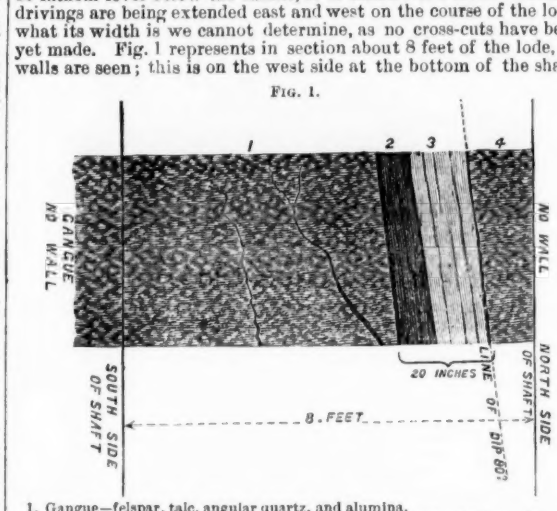
Salt Lake City, Nov. 24. JAS. T. BLANCHARD, C.E., M.E.

COLORADO SILVER MINES.

SIR,—I have commenced, and shall continue as circumstances will admit, a series of thorough practical, instrumental, geological, and mineral surveys of all the prominent silver mines of Clear Creek county. Some of these are of national importance, their great productiveness enriching their respective owners, and adding to the general wealth of the country. As each mine or mineral property is mapped out and valued I shall furnish you with full details; *ad interim*, I will send onward notes current, which, perhaps, may be found interesting to those of my English friends who have already made investments in this rich section of the Rocky Mountains.

THE TERRIBLE.—There never was a time when this valuable mine presented such a splendid appearance as it does now. I made an inspection on Nov. 7, being about three months from my last report, and I am pleased to say that my prospective calculations of that date have been more than realised. To more clearly elucidate the description, I herewith enclose four diagrams, representing transverse sections of as many parts of the lode; and in my next communication shall send forward a topographical map of the valley, the estate, and its surroundings. The engine-shaft has now been sunk to a 20 fathom level below the tunnel, it is called No. 6 level. From it drivings are being extended east and west on the course of the lode, what its width is we cannot determine, as no cross-cuts have been yet made. Fig. 1 represents in section about 8 feet of the lode, no walls are seen; this is on the west side at the bottom of the shaft.

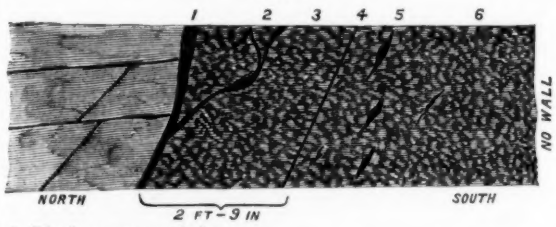
FIG. 1.



1. Gangue—felspar, talc, angular quartz, and alumina.
2. Silver lead, grey copper, blende, sulphuret of iron, &c., 8 in. thick, nearly solid.
3. Flookan, with strings of lead and sulphurets of silver.
4. Gangue. No wall yet seen.

The orey part appears to be the leading vein, it is 20 inches thick, 8 inches of it is mixed ore, consisting of silver-lead, blende, and grey copper, in a quartz matrix; average specific gravity 4·75, or 296·87 lbs. per cubic foot, equivalent to 3·5625 American tons per fathom, about 3 inches out of the 8 inches, assays at 625 ozs. of silver to the ton, the remainder I estimate at 300 ozs. throughout. On this, at the north side, is a felspathic flookan, 12 inches thick, containing thin strings of rich silver ore. The apparent course of the lode is N. 51° E., with a dip of 82° to the northward. Now, if we add the rich strings of silver sulphurets of the flookan to the estimated quantity of silver in the ore above named, we shall find it will give a mean of 400 ozs. to the ton. This silver should bring 80 cents per ounce at Swansea, and the lead 12*l.*, or $60 (present rates of American currency) per ton. The ore carries about 30 per cent. of lead, which is 21 37½ lbs., and which for the English ton of 2240 lbs., will bring $57·25; the amount of silver is 1425 ozs., which, at 80 cents, is $1140, consequently the value of the lode is $1197·25 per fathom. Fifth level: This is 10 fms. below tunnel, and is extended 63 fms. west of the engine-shaft. There is a continuous course of ore all along, varying from 1 to 5 tons per fathom. Fig. 2 is a cross-section of the lode in the back, now in working, near the engine-shaft. It produces 2¼ tons per fathom of very fine close-grained bright ore, rich

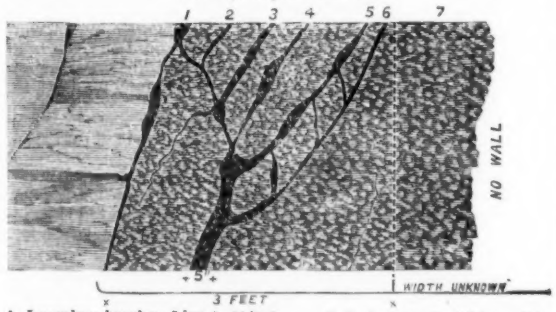
FIG. 2.



1. Mixed ore, average 4 inches.
2. Vein irregular, fine silver-lead averaging 1 inch.
3. Gangue.
4. Thin vein of lead, with films of blue sulphuret of silver.
5. Lenticular shaped lumps, ¼ inch to ¾ inch thick.
6. Continuation of the gangue; there is no appearance of any wall as yet to be seen. This gangue is strongly mineralised throughout. It contains cream and jasper-coloured quartz, prase, and both crystalline, tabular, and decomposed felspar; structure amorphous; concretionary.

in silver. Judging from its density, I should think some portions of it will run to 50 per cent. in lead. The veins along this stope assume very curious and fantastic shapes, in some places they are reticular, at others arborescent (fig. 3 represents one of the latter forms, this is about midway from the shaft and the first winze). If

FIG. 3 (chiefly first-class ore).



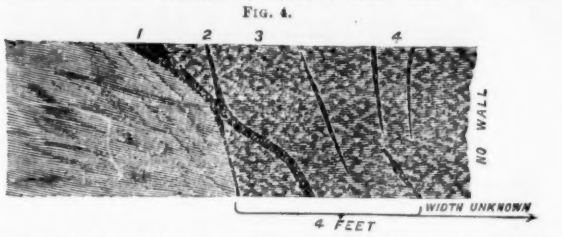
1. Irregular; bunchy; 5 ins. to ½ inch.
2, 3. Average about 2 ins. solid.
4. The main trunk may be taken at the narrowings and bulges, thus—1 in., 3 ins., ¼ in., 7 ins., 3 ins., and 6 ins. at bottom.
5, 6. Collectively will average nearly 2½ inches.
7. Gangue; same as Fig. 2. No wall has yet been cut into.

the stem, which is 5 inches thick, be added to the five branches, the average may be taken at 7 inches of solid ore, one-half which is first class—that is to say, ore running from 450 ozs. to 650 ozs. of silver; it carries but little zinc blende with it. In consequence of the variability of these deposits it is somewhat difficult to arrive at an accurate estimate of quantities, but if we take the whole length of this stope, which is 12 fathoms, at the following estimate, I think it will not be far wide of the reality:—

0·50 ton 1st class ore, at 600 ozs.			300 ozs.
1·00 ton 2nd	,,	at 200 ,,	200 ,,
2·00 tons 3rd	,,	at 40 ,,	80 ,,
3·50 tons of ore per fathom			580 ozs.

To the value of the silver must be added that of the lead, which I think will not be less than 35 per cent. gross. Fig. 4 is the breast at the end of this level. There is a swell or inward thrust of the foot-wall just at this point, but it will not continue far like this, for it dips at an angle of 50° to the north. In a few fathoms it will resume its normal inclination, which is about from 70° to 85°

FIG. 4.



1. Silver-lead, 7 ins. wide at top, running down on the foot-wall to 1 in. on floor.
2. Same ore, 1 in. at top, 3 ins. in the middle, and 4 ins. at bottom.
3. Gangue, somewhat more siliceous and compact, chlorite slightly increasing.
4. Droppers, or small isolated veins; these may be expected to coalesce in 2 or 3 fms. ahead, or immediately the swell or roll of the foot-wall takes its normal inclination.

Here is a fine course of mixed ore; the veins are irregular, but very solid; the two little side veins will fall into the main body as soon as the wall changes, collectively they may be taken at 6 in. thick. Some of the ore is a steel-grey close-grained lead; it is not very rich in silver generally, but very dense; its specific gravity is about 6·00, I think the average may safely be taken at 5·25, this is equal to 328 lbs. per cubic foot. The quantity, therefore, in the end, as now seen, will be 3·201 tons to the fathom. I do not know its percentage in silver, but I should value it at not less than from 275 ozs. to 350 ozs. per ton—say, 300 ozs.; the end, therefore, will figure up to the following valuation:—

Silver, 969·30 ozs., at 80 cents	$768·24
Lead, 35 per cent., is just 1 ton, English	60·00
Value per fathom	$828·24

All the other stopes in the mine are looking exceedingly well, in fact, there is not a foot of ground in this part of the mine, of 63 fathoms in length by 30 fathoms in height, but what has a course of paying ore in it, and will return a large profit for its extraction. There are streaks of ruby and brittle silver in some parts of the lode above the fifth level, assaying from 1500 ozs. to 2000 ozs. to the ton. These I take no notice of, my valuations are made as near commercial as I can possibly obtain data for them. If there are any errors I think they are on the safe side.

The engine-shaft is one of the most substantial and best pieces of miner-like workmanship in the Territory; they have just replaced the little old engine by a new one of 15-horse power, and with new winding gear; it works admirably, and effects a saving of over 50 per cent. on the original cost of hoisting. There is very little water in the mine. The wire tramway is working to perfection. I should like to see a Blake's crusher, with picking tables, take the place of the present spallers, buckers, and cobbers, but everything cannot be done at once; already more has been done here "at a corresponding cost" than at any other mine I know of in Colorado.—The dressing floors: Primitive and crude as the jigging apparatus is, the manager has demonstrated one important fact—that the very poorest of the halvans of these silver mines can be worked off at a profit. Here, now, is an example: during the past summer 1568 tons of refuse from the dumps or halvan piles have been dressed by mere "hand jigging" and tying, at a cost of $4398, or $2·80 per ton, producing $24,070 worth of marketable ore, which has already been sold and turned into hard cash. During this winter works will be constructed for actuating all the dressing machinery by water-power, the dam and flume are finished, and the water-wheel on the premises. When in operation every particle of rock that comes out of the mine containing the least trace of ore will be turned into profit.

I have a good deal more to say about this mine, but I have now already overrun allowable limits. I will, therefore, conclude, by a few comments on the local management. When we look around and witness the miserable failures that have been made by many of our English companies in the selection of their managing agents, the heavy losses they have made, are making, and are yet likely to make, by the incompetency, imprudence, peculation, or idleness of men placed in charge of important works, this of the Terrible stands forward in the light of a "pleasing bold relief." While I would congratulate the directors on the happy choice they have made in selecting a gentleman of "proved" habits of industry, honesty, integrity and perseverance as their manager, I would not condescend, however much I may esteem Mr. Teale, his clerks, and Capts. Lampshire and Eddy, to express undue encomiums, or flatter them beyond what is due to their respective merits, but having been, in my younger days, a mine manager myself, I know what a manager's duties are, and the greatest compliment I can pay Mr. Teale is to inform the public "he is doing his whole duty." We old mining men of Cornwall used to be in the habit of saying, "A good Bal makes a good Cap'n." The aphorism is an erroneous and, in some instances, an unjust one. Had Mr. Teale not been qualified previously for the arduous and responsible duties of manager of the Terrible Mine, this Bal Terrible never would have made him (rich and good as it is) a good Cap'n. CHARLES S. RICHARDSON,

Central City, Colorado, Nov. 15. Mining Engineer, &c.

Since closing this article, there has been found in the fifth level west, just past the swell in the foot-wall heretofore mentioned, one of the finest specimens of wire silver ever seen in this country. It is so beautiful in appearance, and so rich in quality, that I am unable to find words to convey anything like a description. It is to be sent to London at once, and I hope it will be placed in the mineral cabinet of the British Museum. At the same time of this discovery a course of fine silver-bearing ore, worth 3 tons per fathom, has been cut in the sixth level east. I have not had time to analyse it, but shall do so soon, and report results in my next communication. C. S. R.

CAMP FLOYD MINING COMPANY.

SIR,—It is very important that the shareholders should be informed of the present state of affairs, as some resolution will shortly be taken either to continue working or to dispose of the property for a mere trifle; and, therefore, shareholders should be in possession of full information in order to decide which is the most advisable course.

On the company being placed in liquidation, Mr. Henry Sewell took charge of the mill and mines; his instructions were not to incur fresh liabilities pending the liquidation, but knowing the property well, and being interested to some extent, and having great faith in it, and that the shareholders would re-construct so valuable a property, he determined to re-commence work with such funds *of his own* as he could at the time dispose of. Up to the last advices (Nov. 22) he has produced $51,000 bullion from ores reduced at the mill for account of the miners in the district, and the profit of said milling was some 1200*l.* It must be remembered that this is working from hand to mouth, with a capital under 1000*l.*, with continual stoppages for want of supplies, as no credit was given by any bank in Utah during the financial crisis. He has still on hand 180 tons, and more ore coming in, but at times no funds to pay for fuel, wages, or other materials—in fact, only by great sacrifices of every kind has he managed to keep the mill at work; he has also been able to do some work in the mine, sinking on the foot-wall, where there are great hopes of making some discovery shortly, as some of the latest assays give as high as $1500 per ton.

At the mill there are tailings valued at about $40,000, which are the residues of all the ores reduced at the mill since it first started, which can be mixed with any ores purchased by the company for their own account. It is precisely by purchasing the ores, which the miners will gladly sell in order to continue their work, that the company can secure handsome profits, whilst at present it is only making a profit by milling. I propose, therefore, that the company should be re-constructed, giving the full value of the mill, &c., in fully paid shares to the old shareholders, and subscribing or procuring 12,000*l.*, or 1*l.* per share, as debenture capital, with the security of the mill, or some combination of that kind which should meet the general approval; the said capital would be employed in the purchase of ores, and it would, therefore, be always in hand. The mine could be worked on a small scale out of the profits. The mill has cost the company some $18,000, and is a most valuable one in its

present position, since there are sufficient ores produced in the Camp Floyd district to keep it in full work, when the company is not assisting the miners in the vicinity by purchasing or even advancing money on ore delivered at the mill, which ore may be waiting 20 or 30 days for its turn to be crushed, and this during a most severe monetary crisis.

There are proposals to give the shareholders some 6000*l.* cash, and shares, of which, after liquidation, there would remain about 3s. cash for each 10*l.* Camp Floyd share, and a proportion of the shares agreed on in the other company which proposes purchasing. The cash amount will, therefore, be reduced to half of what the South Aurora Company has actually distributed (6000*l.*) as profits solely from milling ores for a few months, and I see no reason why the Camp Floyd mill should not do equally well by milling, and better still if they purchase ores and mill them for their own account. It is contended that the company's mines are not worth working, whereas the work was so badly planned and executed that it can only be considered as trying "how not to prove the mines"—three shafts sunk in very hard limestone rock, each costing a small fortune, and of so little use, since they did not reach the lode, that they might as well have been sunk in Hyde Park. They should have been sunk on the incline to prove the lode as they went down; the little work done in the mine was carried diagonally towards the hanging wall when the ore was always on the footwall. As the other mines at Camp Floyd, even working them on such a small scale, produce enough ore to keep the mill at work, it is a proof of the value of the mines in the district, and I certainly do not think that the company's mine—the Sparrowhawk—will prove the exception.

The company started with an overweight of 120,000*l.*, whereas now it could be, with one-third or one-fourth of that amount in shares and cash, a most valuable mill; in fact, a going concern and a shallow mine to prove, not 50 ft. deep, I believe. Can this be called mining? Had it been supposed the company were likely to dispose of the mill there is little doubt there would have been many offers from which to choose, and I still consider there is plenty of time to carry out that idea as a last resource when the panic in the United States is over, should the shareholders still determine to sacrifice a valuable property. Some persons doubt the mill having made profits, whereas some of the old liabilities at Utah have been paid off, as well as the insurance on the mill. It is rather hard to expect the miners at Camp Floyd to keep their ores waiting, perhaps a month, to have them reduced, and to keep a full supply of ores always on hand ready for the mill to work steadily, without making some advances or purchasing the ores. Having been treasurer for seven years of the Real del Monte Silver Mines, which are amongst the most extensively worked in the world, and knowing that the English company gave them up, and that they have since given splendid returns to the Mexican owners, it is to be hoped the shareholders will hesitate before they accept a few shillings for their 10*l.* shares. The profits of the Real del Monte in milling alone amount some years to 60,000*l.* per annum, exclusive of their mines.

Upper Westbourne-terrace, Dec. 17. JOHN P. SEWELL.

MINING IN UTAH—THE EMMA MINE.

SIR,—I have opportunities possessed by very few for obtaining reliable information as to the Cottonwood Mines, and as a friend of mine—a mining engineer living within a few miles of the Emma Mine—has very recently, by my desire, visited it, I think it will be well that your readers should hear some few of his remarks.

First, in the place where the last discovery was made, a few months back, they have come through to limestone, and work there is discontinued. It appears, too, that there is no working in the mine where anything more than unimportant bunches of ore are found, and that the second-class ore is about finished, and he says he thinks this state of affairs may account for his friend Mr. Attwood's intention to leave next month, which is very much to be regretted, as he is a first-class miner and man, but cannot do impossibilities.

I understand that Mr. Park has bought the Illinois Tunnel claim of 17,000*l.*, and, doubtless, will threaten in his own or some other name to reclaim the mine unless this be met. His own claim of near 30,000*l.* for dividends advanced by him will not be ignored, but he is far too 'cute to reclaim the mine if there be the smallest chance of these amounts, or part of them, being raised here.

Had I followed my friend's advice I should not be, as I am now, *minus* some hundreds of pounds through my ill-founded belief in the vendors, but my recommendation to anyone desirous to increase his holding at the present apparently tempting prices now is to enquire of the directors or committee as to the the truth of these assertions (to which a large addition may be made) or he may before long repeat my undesirable experience. The statement in last week's Journal that there has been another discovery in either Emma or Flagstaff will, I think, be found on enquiry at the offices to be without foundation; and this letter is written solely with the hope that it may be of use to legitimate miners. A LOOKER-ON.

Dec. 17.

THE UTAH SILVER MINING COMPANY.

SIR,—In last week's *Mining Journal* I find that Mr. Longmaid, of the Utah Silver Mining Company, has replied to my letter that appeared in the Journal of Oct. 25, but as I find that "Another Large Shareholder in the Utah Mines" has quite recently written, I may say, the substance of my remarks respecting the Utah mines, I trust Mr. Longmaid will excuse my entertaining my own views on the subject. But he is pleased to represent that the Utah mines are twice as valuable as the Van Mine. Well, if this is so, the parties who managed the Utah Mine previous to Mr. Longmaid taking it over must have been frightfully incompetent. But by Mr. Longmaid's report, that appears in the same paper, he states indirectly that 15,000*l.* more will be required before we see a dividend; but the Van Mine, on a capital of about 60,000*l.*, at once returned dividends; while with about four times as much sunk in the Utah we have nothing but prospects. Mr. Longmaid may be a clever man, but if he ever makes the Utah twice as valuable as the Van he will be an extraordinary one. In the meantime, as I am not so clever as Mr. Longmaid, I should be glad if he would kindly inform me what profit may be expected on each ton of ore from the Utah, after all expenses of all sorts and kind of bringing it to the market are paid, and when he is likely to commence selling ore. I think this information will be more satisfactory to the shareholders in the Utah Mine than the flaming and flourishing reports hitherto published by Capt. Sewell, Mr. Murphy, and others, but the truth of which is not yet verified.

London, Dec. 15. A LARGE SHAREHOLDER.

THE ANGLO-BOLIVIAN SILVER MINING COMPANY.

SIR,—From the prospectus of this company, embracing the most recent reports from the mines, published in last week's Journal, there appears to be every reasonable ground for the belief that it will prove to be one of the most profitable mines yet worked in South America, not even excepting the far-famed Potosi, with which in general terms it may be designated identical. Bolivia was a province of Peru before Boliva, the liberator of South America, releasing it from the yoke of Spain, gave it a separate existence and a name, and within its precincts the famous Potosi yielded its argentiferous treasures. The Bolivian Silver Mining Company possesses a number of mines yielding the queen of metals—silver—and some quantities of the king of metals—gold.

The district is called the Caracoles, and was pronounced by the great geologist Humboldt to be exceedingly rich in silver. Since his day practical miners of eminence and theoretical mineralogists have scrutinised the region, and have confirmed the opinions of the great German philosopher. This company has, therefore, had good grounds for its enterprise, and it has seen for itself, and realised the aphorism—"Experience teaches."

The capital of the company is 100,000*l.* in 20,000 shares of 5*l.* each; but the large interest of 7½ per cent. is allowed to subscribers who pay up their shares in full, otherwise the instalments extend over the greater part of next year. The directors are composed of men of property, reputation, and intelligence. The mines are situated about 120 miles from the Pacific Coast, or rather more according to the roads already used; but the construction of a railway system, which is contemplated, will shorten the distance and save three-fourths of the time in transport. Should the scheme of the navigation of the Amazon, constructing a railway round the falls of the Madeira ever be carried out, as undoubtedly it will at some not distant period, then the produce of the mines can be brought right into the Amazon and to the Atlantic Coast, saving weeks of time between there and England, and reducing the cost to comparatively insignificant dimensions. But, in the meantime this property will, and must, pay from the quality of its produce, for as a journal of the Republic repeats, *apropos* of these mines—"Bolivia is once more commencing to pour into the world an amount of silver worthy of her old reputation when she gave to Peru her fame as the greatest silver-producing country known." The positive results of the present company's operations establish the truth of these remarks.

One of the chief of the groups of mines wrought in the district is the "Descubridoras," or "Discoverers." They were first opened three years ago. The yield last January, according to a report published in a local journal, since confirmed by the company's agent, was 165,000*l.*, appraising at 4s. per ounce the price the product brings. The *South Pacific Times* of March 28 states the production of the principal mines at Caracoles then as averaging three-and-a-half million sterling per annum. Specimens of all the ores have been assayed by the most experienced persons in London competent to make scientific examinations, with results surpassing the most sanguine expectations and hopes of the company. Mr. Wm. Bray, whose experience in such matters is well known in America and in England, states that an engineer at one of the mines, the "Descada," had broken and brought to surface ores of the value of 113*l.* per ton, the actual yield being 11,000 quintals.

In summing up an article on these mines the *Caracolina Journal* observes that they are good milch cows, maintained with excellent pastures, and looked after with intelligence and care, the constant production speaks for itself."

I heartily congratulate the company on their good luck in obtaining this property. Their procedure now is not a matter of luck, but of certain success, craving the application of intelligence and capital. AN OLD CORNISH MINER.

THE IRON ORES OF SANTANDER, SPAIN.

SIR,—Referring to the article which appeared in last Saturday's Journal, relating to a new company, called the Santander Iron Ore Company (Limited), I should feel obliged by your stating that the company mentioned by you is in no way connected with the Santander Mining Company (Limited), which owns large iron ore mines in the district of Santander, and which has now been in full working order for nearly two years. HY. CARTER,

Secretary of the Santander Mining Company.

Laurence Pountney-hill, London, Dec. 19.

THE RICHMOND CONSOLIDATED MINING COMPANY.

SIR,—The ingenuity and perversity manifested in the various methods adopted to shake the confidence of the shareholders in the soundness of their property is truly remarkable. Shareholders have been assured, as a fact, that the whole of the money with which the last dividend was paid was borrowed of some financial company; the fact being, as I have ascertained, that the company has never borrowed anything of anyone since the date of the original loan, in the early part of 1872, which debt has been reduced one-half. Then the question is gravely asked if the estimate of profit on bullion is based on 95 cents per ounce, instead of 81 35 cents; a question betraying such ludicrous ignorance that it would be waste of time to allude to it. But the fact that country shareholders do not, as a rule, understand matters of this kind, and seeing in the papers that silver bullion in *Utah* was for a few days quoted at 95 cents, jump to the conclusion, from such an insidious question being asked, 2000 miles off, that our bullion at *New York* is being sacrificed at that figure. The fact being that there silver was but slightly affected, and has recovered so rapidly that it is now at 1 cent prem. The composite character of our bullion (gold, silver, and lead, the two former equal to 39*l.* in cash per ton, and the latter 15*l.*) gives, as a rule, a tolerably uniform average; the lead, at the present moment, being the only metal still affected by the recent depression.

It is not a matter of much moment, save as a question of a few weeks delay, whether the profits of the company stand in cash at the bankers or in bullion in the hands of the broker. The profit is almost as easily demonstrable in the one case as in the other. I have reason even to believe that the actual profits will turn out to be larger when converted into cash than as they now stand estimated in bullion. For this reason, that a large margin is left in the latter instance, which has no evidence in the former.

In cash, then, or bullion, our profits are declared to be 32,000*l.* for the two months of September and October; that is since the date of the balance-sheet, when the last dividend was declared. Now, as it is announced by cable yesterday in the public papers that the profits for November were 15,400*l.*, we thus get 47,000*l.* profit in cash or bullion for the three months since Aug. 31.

How much of this it may be prudent to distribute as dividend is a matter for the board to consider. The period for doing it will naturally depend on the time it takes from the bullion reaching New York to the date of its realisation in cash. We are told that two months are generally required; the profit, therefore, for September and October will probably be in hand by the beginning of January; that for November not till the middle of February. If shareholders will weigh these facts they will, I think, see the meaning of the last paragraph in the last circular. S. A. POSTLETHWAITE.

London, Dec. 19.

LEGITIMATE MINING.

SIR,—I scarcely know a more hackneyed phrase than that heading this letter, nor one more important as affecting one of the greatest industries of this or any country. It appears to be but little understood how much mankind at large are indebted to mining, the arts and sciences also, as well as commerce and every other industry, for the instruments and mechanism of their progress and advancement. Nor is it but little understood upon how many auxiliary branches of knowledge and science this great industry depends, not only for its warrant of the prefix legitimate, but for its ordinary success in many instances. The science of mathematics, of chemistry, of mechanical philosophy, and, not least, the abstract philosophy of induction—upon the correctness of which the success of the most enterprising part of mining depends—enter largely into controlling and regulating its operations and the results. But, apart from its own inherent and inalienable abstruseness, and the complications of its numerous and many-sided detail, it is exposed on all sids to abuse and calumny. Its interests are opposed, contemned, and damaged by ignorant outsiders, and those, too, who are every day most dependent on its products, in one form or another, for the instruments, if not the material, of their own wealth, comfort, convenience, and security; and yet thousands of such men, who never earned a penny but by the aid of mining, and never can, carry themselves as much above it, and act as though they were as independent of it as the "man in the moon." England owes her greatness to it, under patronage of the Supreme Universal Ruler, and so does, and so must, every other country who already have or yet may attain unto a similar greatness. But the avowed enemies of mining are not those who do it the greatest injustice and injury. Its professed friends in a large number of instances are found to be its most fatal foes.

There are two vitally important yet utterly dissimilar divisions of mining, the proper conduct of both of which is essential to its "legitimate" or full success; I mean, of course, its practical and commercial sides, which, however dissimilar in their modes of operation, are animated by one and the same incentive—gain. By practical mining the most secluded treasure-house of Nature is unlocked: and wealth, which had been accumulating for ages and generations of time, is developed and brought to light. But by the other (commercial mining) the current equivalent or recognised standard of the value of wealth is made more mobile and operative; but, unlike the practical division of mining, the acceleration of the motion of the circulating medium can never increase its volume or multiply its parts; that is simply an exchange of ownership or custodians. The disparity, then, between these two divisions becomes at once apparent, and no further argument or illustration is necessary to show which division is most important to general issues, or that has the greatest claim to public attention and support. To thoroughly investigate the *pros* and *cons* of legitimate mining would lead into a variety of channels and involve a great number of considerations, yet all tending to promote one common end. First of all, the objective and mechanical parts of mining would claim attention, together with all the ramifications of those separate, distinct, and yet closely consecutive and essentially fundamental parts.

The term legitimate in its application to mining respects the voluntary action of interested parties; and its definition is beautiful in such a connection, not very dissimilar to that of wisdom itself. It may be summed up and expressed in the following terms. It is the best employment of the best means to the accomplishment of certain specified ends. Quality as respects the objective in mining must always be paramount. If the object to which expensive effort is directed proves to be worthless, the expenditure in such a case, pecuniarily considered, is an absolute loss; but such an expenditure might, nevertheless, have been in a practical sense most judiciously or legitimately applied—that is to say, that the outlay to determine a doubtful matter was made at all points with strict reference to economy and dispatch. It will be seen that the term "legitimate" may apply in practice to unsuccessful efforts and adventures, a fact which few, if any, are careful to trouble themselves much about, especially those whose exchequer has been diminished by such speculations. If the objects or sources whence a sufficiently compensating revenue of returns prove utterly incapable, the greatest engineering skill, even if enlightened by all the sciences, cannot compensate for such a deficiency, however valuable it may be in itself and useful in retrenching. It will, therefore, be seen that an important measure by which the success of mining is largely affected takes precedence of all practical operations, and ought not to be confounded therewith, except in theory only, and not even then unless such theories were approved by both scientific and practical men of good standing. It sometimes, and not unfrequently, happens that practical men are not consulted in the selection and purchase of mining adventures, or if they are appealed to at all it is merely for form's sake, or secondary to some ignorant pretender—dubbed professor—whose pretence and learned nonsense they had been previously given to understand would be esteemed as paramount.

In respect of the "Emma," all the lesser lights were obscured by Prof. Silliman. I do not think—and I have some foundation for my judgment, as I was in Nevada, connected with silver mining, at the time of the professor's memorable visit to the Emma Mine—that any native born or naturalised citizen of America would have paid his expenses from Salt Lake City out to the mines without full confidence in the value and importance attached to his knowledge or judgment of mining, however largely they might have been interested therein. Errors of that gigantic class can never be retrieved, however, by any subsequent modifications or improvements which may be introduced, whilst the troubles and inconveniences which spring therefrom are numerous and forever repeating themselves; and unoffending practicals are burdened with incessant cares arising from such indiscretions, even supposing that nothing worse than "indiscretion" conduced to such misfortunes. In respect to the disasters which have attended so many American mining enterprises, Englishmen who were on or near the mines at the time negociations for their purchase by English capitalists were pending have been somewhat reflected on, because they did not warn their countrymen against the snares and dangers which awaited them in time to prevent the immense sacrifices which have been made.

Such reflections are undeserved. In the first place the English were warned in the only way in which warning could be given by Englishmen resident in America. Warning on general principles in terms sufficiently clear to be correctly interpreted, and if heeded to have so operated as to conserve English interests and the general interests of mining. I was personally jealous of both of these interests, and exerted myself so far as I was able to avert the evil which I so clearly saw impending. Letter after letter I addressed to you, Sir, and you kindly published them in the *Mining Journal*, pointing out the treacherous character of the limestone rocks in those volcanic regions. The undefined and highly sensational character of the metalliferons deposits occurring therein, the undeveloped state and condition of the mines generally, the impropriety of rushing headlong after Nature's fagend achievements, sections of ground, country rocks, whose structure is opposed to regular and consecutive fissuring, and as uncongenial physically to supply the primal elements of metalliferous deposits as it was unconformable in structure and texture to admit of the formation within its bosom of those universally appreciated fissures, which when furnished to repletion are found almost exhaustless storehouses of wealth to succeeding generations of men.

I had long previously read in ancient story of the stupendous power of Nature's architect, when the writer, speaking of that power, expressed himself thus: "He overturneth the mountains by the roots;" but it remained for me to visit Nevada before I was privileged to witness an accomplished illustration of the fact itself; so that what before seemed only to me poetical sublimity was found to be an ocular demonstrated fact in Nature itself—mountains of granite and other mountains succesively overturned and laid prostrate, like trees thrown down, or tilted at greatly inclined angles from their normal positions, by the upheaval of other mountainous masses which rend the ponderous piles asunder, and rising still with resistless force through the disparted rocks, bearing upon their shoulders, so to speak, the incalculable pressure of superincumbent mountains until they attain an altitude transcending all which had preceded them; and whilst mountains, which once stood where they now stand, totter and fall in deep abasement to their feet, they display respectively a crest in mid-heavens which seem to bid defiance to any similar fate ever overtaking them. From the discursive view I have taken in this letter I shall be under the necessity of asking your indulgence for another letter on the subject, which I will try to forward next week. ROBT. KNAPP.

Llanrwst, Dec. 16.

MINERS' CONVERSATIONS—No. IX.

John.—Speaking of persons who have realised fortunes by mines, we should not overlook the late Mr. Collan Harvey, the father of Mr. Richard Harvey, who died lately in Devonshire. Mr. C. Harvey commenced life as a cooper at St. Day. Mr. John Williams, of Scorrier, the father of the late Messrs. John, Michael, and William Williams (I believe) married his sister. As a kind-hearted brother-in-law, Mr. Williams promoted Mr. Harvey's interest so far as he could in his business. In addition to a cooperage he had a large shop in that village, whence all Mr. Williams's mines were supplied with such things in Mr. Harvey's line as were needed—iron, candles, ironmongery, steel, stationery, &c. It used to be said that every material thing needful to man could be had at that shop—from the largest article down to a pin or a shoe-nail. Not only were the mines supplied but the miners too, and all the miners working at Mr. Williams's mines were expected by Mr. Harvey to resort thither for supplies of everything required to be eaten and worn. He had several clerks in his office, all of whom are dead except Mr. R. Cliff, now in London, and Mr. Dunsterville, of this town (Redruth). These two were travellers in the flour trade. The late Mr. B. Matthews was the "truck" clerk (the system was called the "truck system"), for his office (amongst other things) was to go to the mines on pay-days with every man's account, and deduct from the pay-sheet the amount due from each. Mr. Harvey had not sufficient confidence in the men to permit them to receive and pay the moneys. He also largely dealt in timber, coals, &c., at Truro and elsewhere. In process of time he naturally became rich, and invested money with Williams, Foster, and Co. in the copper trade, and also in the tin smelting business with Messrs. Williams and Co. When he became an old man he retired to Pengreep, now the seat of Mr. John Williams, where he died. His partner and brother, James Harvey, also died, when the shop business was closed. I have heard that on going out of the copper trade Mr. C. Harvey received for his interest 350,000*l.*; how much he received for his tin interest I know not. He left his son Richard as the only survivor. He had had two daughters—the eldest was married to the late Mr. W. Michell, the Vice-Warden's Registrar, and the youngest, Harriet, died a "spinster," as the lawyers called an unmarried young lady. To his son Richard he bequeathed all his freehold and personal estate, amounting to a very large sum in value—perhaps nearly a million. Richard married a young lady who was a governess at Tregullow, the residence of the Dowager Lady Williams, the mother of Sir F. M. Williams, Bart., M.P. A son was the only issue of that marriage, whose advent into the world is said to have caused tears of joy in his grandfather's eyes. But, alas! the child, after being removed for fear of an epi-

demic then prevalent, died in infancy about 20 years ago, much, doubtless, to the grief of father, mother, and grandfather. Having no child to inherit his immense fortune, and having no disposition to foster charities, Mr. Richard Harvey left nearly all his property to his good solicitor, in consideration of his urbanity! It strikes me that it would have been much more reasonable to have given all to the Williams family, Mr. John Williams having laid the foundation for the wealth. I should remark that he gave his truck clerk 5000*l.*, and a legacy or two besides.

Bill.—I know most of the facts which you have narrated. I remember that Mr. Collan Harvey was called by the miners "father" amongst themselves, because he was the provider of the necessaries of life. Little did Collan Harvey, when labouring to be rich, think that all he acquired was going to pay for a lawyer's "urbanity." The last Mr. Ben. Sampson gave all his estate to a lawyer on much the same ground. It would have been much better if they had founded or aided some institution for the good of the poor. No doubt a separation from wealth must occasion great grief to its possessor, especially when he has no child to receive it. "We brought nothing into the world, and we can carry nothing out of it," and "we must needs die," are well-known truths, but little reflected on.

John.—I knew the first Mr. Ben. Sampson, who died about 30 years ago at Tullimaar. He was at first a mine carpenter, afterwards a clerk at Perran Foundry, where he ultimately became a small partner in that company. He acquired a great property, but nothing like Harvey's. The Kennall gunpowder manufacture enriched him. I was amused with an anecdote I heard concerning him. He had some pride, like all upstarts, and did not like people to know his original condition. His pride met with a mortification one day at a Petty Session at Bodmin. A miner who was being examined as a witness stated that he came from Gwennap. Mr. Sampson said, "You came from Gwennap? I have no recollection of you." "I knew you, sir, very well," said the man, "When you was a carpenter at Tresavean!" That put a dead stop to further remarks.

Bill.—Nobody, scarcely, raised from poverty is willing to have it known that they were once poor. They wish the fact to be forgotten. Some rich people are almost ashamed to have it known that they acquired riches by honest trading; but those who can look back over generations of descending wealth pride themselves on it. Wealth and titles are something like wine, they acquire value by time.

John.—You were telling just now something about lawyers. The mention of a lawyer reminds me of a funny anecdote which occurred a long while ago, although very lately related to me. It occurred at a mine meeting, when a great number of shareholders were present. * * * * * One day he was dining at a public meeting at Helston, and amongst the company present was a lawyer, of aristocratic bearing, who, taking a spoonful of hot pudding, scalded his mouth badly. The old lawyer spontaneously laughed, not for a moment intending any insult. The next morning he received from the scalded man a letter demanding "the satisfaction due to a gentleman," which is well understood. The old lawyer (he was not very old then) wrote a reply in the following words:—"Sir: I beg to acknowledge the receipt of your invitation, which I am willing to accept on the following condition. You know that I have a wife and family to provide for. Now, if you are willing to assign your property for their benefit in case of my death I will go out to be shot at." He heard no more about the "satisfaction" required. The challenger afterwards killed himself.

Bill.—The writer of that letter acted more like a man of common sense than most of the people who quarrel among the rich. They generally act like fools when they fall out, and the most persistent challenger often falls first in the duel.

John.—How one thing leads to another! We began talking about mines, and now we come to duels.

Bill.—I don't think after all that we are very much out, for I dare say mining quarrels have led to duels. I know that mining people have killed themselves.

John.—The verdict "temporary insanity" is most commonly returned in suicidal cases; that of *felo de se* rarely, but the latter in many cases would be the correct verdict. The first kind of verdict is given in deference to "the feelings of the family," because the other verdict would not admit of funeral (church) rites. Ten thousand ceremonies or prayers would not alter the condition of the self-murderer, who, as a rule, goes to a place the mention of which I forbear. Let Blair, in his "Grave," speak to you of it.

St. Just, Dec. 17. AGENT.

REMARKS ON THE ORIGINAL CORRESPONDENCE IN THE SUPPLEMENT TO LAST WEEK'S "MINING JOURNAL."

SIR,—It is with considerable pleasure that we direct attention to the well-written and suggestive article on "The Gold Coast of Africa," by Mr. George Peacock, F.R.G.S. This contains a vast amount of information in small compass, which is a great desideratum in these days. To the reader desirous of information on this important and interesting part of the world this letter will be found of great value, conveying information not always within reach, and displaying great learning and research. Mr. John Longmaid gives us an interesting account of the Utah Silver Mining Company; "Miner," some valuable information on the Blue Tent Hydraulic Mining Company; and "Carbon," on the Gauley-Kanawha Coal Company. "Observer," writing on "Silver in Copper Ores," misrepresents Mr. M. W. Bawden, who did not say, as "Observer" represents, "that the whole of the mineralised matter in all the lodes hitherto discovered in England would yield on an average 6 ozs. of silver per ton." Mr. Bawden's statement was that the "copper ore" produced from certain mines yielded that proportion of silver, which is a very different statement indeed. The letters on Steam Pumps, and Mining by Machinery, being controversial, and not very complimentary, do not come within the scope of our review. "Miners' Conversations" do not contain much matter of general interest, though they may be locally very entertaining. N. Ennor's advice to men inclined to speculate in English Mines is not likely to be much followed. If every shareholder holding one share occupied so much of the time of the "executive" as Mr. Ennor's plan would require there would not, indeed, be much tin in the Red River, as it would all remain underground for a future generation, like the silver was left by Mr. Ennor in Old Treburgett.

"West Wheal Seton, and its Management." Our remarks last week under this head were so metamorphosed by an unfortunate transposition in your compositors' office, that we do not suppose they were understood by any one. Our remarks were written as follows:—"West Wheal Seton." "C." "Had matters been as badly conducted here as "C." represents, we think it would have been so stated at the meeting, as that would have supplied ample reason for the shareholders present to have concurred in the change of management proposed; that not having been stated then, we cannot now give much credence thereto." Your correspondent, this week, "J. Z. W.," shows clearly that the view we took of this matter was not far from a correct one.

"Mine Management—The Five-Weeks Month." If "C. P." is satisfied that to try to make 13 months out of 12 is so fair that every other course is "unnatural, unreasonable, and unprofitable to mining," we must leave it to the full enjoyment of his own opinion. We think that it is equally just for a merchant to supply 12 tons of coals and charge 13 for it, a carrier to work 12 horses and charge 13, or a landlord to demand his year's rent at the end of 11 months. We do not object to seeing the miner paid more frequently; indeed, we would advocate his being paid-*up* every Saturday evening, believing that that course would be found beneficial to employer and employed; but we still think that 13 *months* in one year cannot be fairly contended for. Your correspondent's experience, if any he has had, must have been in a strange school. We quote from his letter, "The established charges in mines are the same whether men work or play;" and again, "If you attempt to force men you will not get fair value for your money." Does not this seem to imply that you may as well let men work or play just as *they* think fit? From this your correspondent proceeds to moralise on "labour," "capital," "strikes," and "see-saws." Does "C. P." think that a certain amount of strife between capital and labour will ever cease to exist? We are among those who believe that "the labourer is worthy of his hire," and hope never again to see the day when he can be ground down below a fair day's pay for a fair day's work; but we cannot fail to recognise the many impositions to which the employer is often subjected by unjust and lazy men. We think that each of these interests have an equal right to protect itself against injustice from the other side, which will ever arise so long as man exists, as at present constituted.

"Brynn Mine." If both Messrs. Parkyn and Co. and Mr. Martin Rickard would turn their attention to the production of tin from their mines, and less to the writing of inflated letters, it would be better for their shareholders. "Holywell" gives a hopeful account of "St. Lawrence Amalgamated Mining Company," while "A. G." seems to be another victim to misplaced confidence. Mr. S. R. Cocks has another "shallow bal" in Wheal Tregoss which he thinks will prove a *bona fide* mine. According to people's experiences this expression would convey different meanings; for while to some mining has been profitable, to others the word has been synonymous with loss; and to the latter a *bona fide* mine would be no recommendation. Will Mr. Cocks be more explicit?

READERS OF THE MINING JOURNAL.

"ORIGINAL CORRESPONDENCE" IN THE "MINING JOURNAL."

SIR,—"Readers of the *Mining Journal*," in their criticisms of last week, are very amusing, and generally take a fair view of both sides of the question. In one instance, however, they refer to the letter of Mr. E. Betteley, on the Furze Hill Tin Mine, in this district, but fail to supply any definite information respecting it. Now, although not a shareholder or interested in the mine, I will, with your permission, again revert to it, and, by way of supplement to the remarks I made in my letter of Nov. 29, endeavour to supply the want of your readers.

This mine is situated in the parish of Walkhampton; the stratum is killas, which is contiguous, and, indeed, close to the granite range of Dartmoor, a district which in times past must have been particularly productive for tin, for it is reported that 30,000 tinners were once at work on the Moor. Every stream and valley in the vicinity of the mine bears evidence of the debris having all been worked over by the ancient miners, and the excavations made by them in the mine are, perhaps, of greater depth than any known in the two counties. Cross-cut adits of great length have been driven to unwater the lodes. These operations must have cost a great deal of money, even in those remote times. A few years ago a most lamentable accident occurred by communicating to old workings in the 40 fathom level, whereby several men were drowned, and the mines suspended. The water has since been pumped considerably below this depth, and, so far as seen, the lodes are stoped away, showing clearly that they must have been very productive. Mr. Betteley has given so full a description of the machinery and appliances that it is unnecessary for me to say more on this point. The last report of the agent shows that the 54 fathom level is being pushed on eastward to get under the old workings, and I have not the least doubt but that the result will be a brilliant discovery. The number of known lodes (five, I think, within a distance of 60 fms.), the easy nature of the ground, and water-power exclusively, are especially noticeable, and I have reason to believe that Furze Hill will prove the pioneer tin mine of Devonshire, and be as much sought after in a short time as many of the profitable yet deep and costly mines of the Sister County. I am informed that the returns are about meeting the cost, exclusive of a few erections. These are now nearly completed, when larger returns can be made, and with a moderate discovery even this mine will soon enter the paying list. MINER.

Dec. 18.

ROCK DRILLS.

SIR,—In replying to Mr. Ball's letter of last week, we would first wish to ask that he will explain more particularly what is to be understood by "anti-concussion" in the drill of Dubois-François, and the method by which it is effected, so that we may be able to judge of its efficiency. Also whether the machine is automatic, and the length, weight, volume, and force of the machine for mining purposes, and whether the same machine is adaptable to shaft-sinking and drifting. As to the statement of work performed by the machine in the case mentioned, to which Mr. Ball calls our attention, we find an important omission. The comparative cost is not stated. If a boring-machine is of such construction that it can be relied upon to do its work for a long period without breaking, that is one thing; but if for every machine working there must be two or three in readiness, or in course of repairs, that is quite another thing. We think the statement of Sir George Denys in regard to the working of our machine, published in the *Mining Journal* of Oct. 4 last, is more definite and satisfactory.

In our machine, by that "peculiar swelling" on the back end of the piston-rod, we get from one solid piece of metal—the steel piston—all the necessary movements of reciprocation, rotation, and automatic self-adjusting feed, and we claim that there is no concussion or shock upon any of the parts of the mechanism except the blow upon the solid piston itself; or, at most, none such as to be destructive, or render the machine inefficient, otherwise than as a steam-engine, or other working mechanism, which wears according to use, with time requires repairing, and eventually is worn out. The rapidity of strokes given by the machine to the number stated (1200 per minute) does not cause the breaking of any part of the mechanism. The piston does not, and cannot, strike against the end of the cylinder, by reason of the cushion of steam, or compressed air, which effectually prevents it, and the movement of the other parts, resulting from the alternating motion of the piston is not the effect of "blows delivered" upon them. The violence of the blow received by the solid piston is not communicated to the other parts, so as to break them, or even to cause rapid wear from friction, and a very considerable displacement of metal must occur to render the machine inoperative, and require the renewal of parts.

We must differ with Mr. Ball as to the value of a public and thorough trial of boring machines in the presence of a jury of practical mining and civil engineers. Such a trial could be as satisfactory as exhibitions generally are, at least; and, as a specialty, thoroughly examined and tested by comparison in such manner, we think more so.—32, *Lombard-street, Dec.* 17. MCKEAN AND CO.

WEST WHEAL SETON, AND ITS MANAGEMENT.

SIR,—Since writing my reply to "C.," published in last week's Journal, respecting the Red River question and its sources of slime supplies, I have gleaned more facts which will still further exonerate the agents of West Wheal Seton from making such ridiculous and wilful waste of tin as "C." attempts, although vainly, to charge them with. The first fact I have gleaned in my researches is that the number of mines emptying their refuse in the said stream are fourteen, returning between them about 500 tons of tin per month, instead of nine mines, returning 300 tons per month, as stated in my last. So, Sir, the aggregate will show that the quantity returned from West Seton is nearly forty times smaller than the combined quantity returned from the fourteen mines whose refuse flows down this stream.

Again, Sir, I have discovered that the refuse of Tincroft and Carn Brea joins confluence above the mine in question, and not after, as I believe I last stated; West Wheal Seton, therefore, joins last. I also informed you in my last that the companies I alluded to as those who return most on the river have lately—at least, since my last visit there—been superseded by another on the opposite side of the river, whose works are still larger. Now, the company alluded to in my last is the party working exactly behind West Wheal Seton, and have the first chance of their refuse, whilst the company on the opposite of the river get little or nothing of this mine's refuse, and still return more tin than any other company on the river. Still I maintain their excess of returns arises more from the extent of their machinery than from the riches of the slime washed down. For instance, were any of the companies further up to supersede them the extra machinery would give them the excess of returns; on the other hand, were the company next below to take supersedence of machinery from this company they would then show most returns. The facts here stated, together with those stated in my last, will, I imagine, convince your most obstinate readers, and amongst the number "C." himself. Surely this gentleman will not attempt again to rebut the truth with such a perversion of facts as he brought forward in his last; at all events, part of the truth will not prevail over the whole truth. J. Z. W.

Plymouth, Dec. 17.

WEST WHEAL SETON, AND THE RED RIVER.

SIR,—As "J. Z. W.," in the Supplement to last week's Journal, makes it out to be of such importance that all the mines emptying their waste waters into the Red River should be mentioned in detail, I ought, perhaps, to regret having omitted them in my letter which you so kindly published on the 6th instant. I find, however, in the long list of mines mentioned by "J. Z. W." that he also has neglected to state the names of three other mines of considerable importance which contribute slimes and sand to the same stream—South Condurrow, Wheal Grenville, and South Wheal Crofty. My only motive in omitting to mention the names of all the mines whose waste waters constitute the Red River was that they have been so often brought before the public of late in connection with the river, both in the Journal and local newspapers, that I considered all persons interested in the mines of West Cornwall required no further information in the matter. Furthermore, I trust that none of your readers will imagine for one moment that I intended them to believe that Dolcoath and West Wheal Seton were the only two contributories to this now famous tin stream, because such an absurd thing never once occurred to me. Respecting the waste water from Carn Brea and Tincroft Mines, which "J. Z. W." reminds me of in such a triumphant manner, I will embrace the opportunity of stating that the adventurers in these mines have for many years past stocked the slimes and sand within the limits of the setts, so that nothing but the impoverished slime water escapes over their boundaries, which then passes along the Poole valley, where it is again worked over and over by three or four different companies, and consequently becomes still more impoverished long before it unites with the Red River.

The only other portion of "J. Z. W.'s" letter deserving further comment is that wherein he states that from 80 to 99 per cent. of all the slime refuse of 300 tons of tin per month comes down in one unbroken rush of water to the point stated in my former letter—the confluence of the West Seton water with the Red River—and that the company immediately behind this confluence work over 50 or 60 per cent. of the whole, against 10 to 15 per cent. only worked by the companies above. Now, Sir, this is altogether inaccurate, and I am not willing to believe that such a statement has been made by anyone well acquainted with the river.

Immediately above the point where the waste water of West Wheal Seton flows into the Red River there are two very extensive stream works, one of which, I believe, was the first and for some years the only one on the stream. This company's plant extends over an area of some acres, and into which pass the entire river. The works of the next company adjoining below, and on the verge of the West Seton tributary, cover also acres of ground, with the right to work 50 per cent. of the river. The latter of these workings is considered to have cost 10,000*l.* It will be seen from this that the river here has been subjected to an immense dredging in addition to all the minor works, and this, too, immediately before it passes into the works of the company, situated directly behind the West Seton tributary, and whose returns of tin have been greater than any other company's on the stream.

While thanking "J. Z. W." for his advice before my appearing again in print, I must decline following his example, as the indulgence in borrowed threadbare epithets does not strengthen argument.—*Camborne, Dec.* 17. C.

ENGLISH MINING, PRESENT AND FUTURE.

SIR,—"A soft answer turneth away wrath," and "Observer" of last week is so mild in his rebukes, and conveys such courteous language with an open desire for the truth and nothing but the truth to be elicited, that I beg to apologise for any uncouth remarks made by me in your Journal respecting that gentleman; he is, no doubt, quite correct in most of his assertions with reference to the days of Malachi and the rich silver lode running through the Wheal Barnard and Prince of Wales Mines, but, after all, the mines and their representatives are more to be pitied than blamed for rich bunches of silver being small and few and far between. As regards eclipsing the riches of Peru, bitter experience has taught me that the search for silver must be conducted amongst the low-class stuff which really exists in unlimited abundance, instead of devoting entire attention in the scrambling for rich deposits, which are here to-day and gone to-morrow. Albeit by turning the poor material into wealth, a rich shoot now and then need not be ignored, but welcomed as an occasional auxiliary. Let me only have fair play. I court every criticism, and only aim at a legitimate success. It is true that many of my promises have not yet been fulfilled, but the short comings can easily be accounted for; the Barnard of to-day is not the infatuated Barnard who existed four years ago, and appeared before the world like a workman who only half knows his business, simply because he had never served an apprenticeship, but even then the untutored amateur artizan collected ten of thousands of pounds for some of the best mines in England, and the result of non-success only points another finger to the fact so strongly set forth by "Observer," Mr. Ennor, and many of your correspondents, that English mining generally is and has been a lamentable failure. It is, perhaps, not politic for me to publish the fact, but every 8*l.* worth of copper ore sold from the Devon Consols has cost someone 100*l.*, and I am confident that every ton of tin sold in England for 75*l.* takes at least 150*l.* to secure it, only of course there are a few great prizes with large fortunes, and in the general rush for them the blanks, which are legion, escape notice. If you, Mr. Editor, or any of your readers call this successful mining I do not, and if this is to be the end of my bright hopes I shall be sorely disappointed. Returning to the subject of rich silver ore, the Wheal Barnard and Prince of Wales Mines produced in about 5 fathoms of ground, where the setts join, over 3000*l.* worth of silver—no dream, but a reality. I myself assisted in raising one rock which weighed 84 lbs., 20 per cent. of it pure silver, and upon the same lode stones of silver ore have been brought to surface worth, as found, 4*s.* per oz. Peru can hardly excel England for the quality of picked specimens, but, alas, quantity and quality combined are against our Mother Country. I would infinitely rather have the tin and copper lodes, which are regular, and if 1000 or 1,000,000 tons exist giving 10 ozs. of silver per ton it is easy enough to make a calculation, and the only problem to solve is the returning of it at a profit. The great and grand secret of successful mining is concentration, and where nature has itself lavishly effected this noble work, man has only to take advantage and secure the all-important benefits, but man has also by the aid of science and labour the means bestowed upon him of forcing nature, and 1000 ozs. of silver can be obtained from 100 tons of stuff, giving 10 ozs. per ton, every whit as much as from 1 ton yielding 1000 ozs. It is simply a matter of concentration, the prime mover being the discovery of the best and cheapest method of completing the work begun by a Divine law, and no doubt left in its present unfinished state for a special purpose to encourage industry and labour. Let any practical man pay a visit to the Wheal Barnard, and learn that what has hitherto been considered waste rubbish, 2 per cent. copper ore and 10 ozs. of silver per ton, is now being concentrated by a single and inexpensive process to 70 per cent. copper and hundreds of ounces silver per ton; this will at once settle the dispute respecting silver existing in copper lodes. Take a lead mine, and if the lead found is 10 per cent., and concentrated to 70, i. very rarely contains more than 40 ozs. silver, but here 1 per cent. copper can be brought up to 70 per cent., and hundreds of ounces silver. In conclusion, "Observer" gives me a very good text by referring to the New Devon Consols Mine. Capt. Pryor is, I am persuaded, too sensible to take my remarks amiss; it is not for me to interfere in the matter of the reason of this mine not giving dividends with nearly 2000*l.* per month returns from the sale of tin ores and arsenic, neither do I wish to refer to the marvellously extensive buildings and machinery, &c., erected upon the mine, which, in my opinion, are the groundwork for immense wealth; but just the same as Capt. Pryor came forward after discovering that tin existed in the arsenical pyrites, I would now suggest that the greatest wealth of all, the silver, is escaping notice. Yes, facts and figures again. Allowing that 20 lbs. of tin are taken from every ton of stuff treated in order to produce only 20 tons of tin per month, 2240 tons must pass through a certain number of hands, and undergo a certain process, with the end in view of concentrating the tin. This represents at only 8 ozs. silver per ton 17,920 ozs. silver, or in money value of 4480*l.*; and considering that the silver can be extracted at considerably less cost than the tin, I venture to remark that it would be a wise policy to secure and sell it. First of all it is highly imperative to ascertain the exact amount of silver contained in each ton, and what can be more easy? Take a sample of 100 tons, and in the presence of Capt. Pryor, and any other practical miner if required, Capt. W. Knot will make three assays, and if they are all alike there can be little doubt as to the actual correct existence of the amount of silver: perhaps it will be more than 8 ozs., especially after the arsenic has been removed; however, it is my aim to be under rather than over the mark. Now, it so happens that with a little difference in chemical details exactly the same ground has to be gone over for concentrating silver as tin, and, therefore, with 500*l.* cost in some extra plant for the special requirements of the silver department I will undertake to extract 9-10ths of the actual silver existing in the ore, which shall make the mine one of the very richest in England. As regards working cost, allowing that the stuff must be calcined and pulverised to secure the tin, 7*s.* 6*d.* per ton will be the outside expense upon a large scale. This is no mere chimerical idea; the whole subject may have originated, or had its starting point, in the weak, erring, and wandering brain of the writer, and his love of figures, but the figures happen to be substantiated by facts, as the following will prove. Take the average of the country for tin (say) 20 lbs. to the ton, worth 15*s.*, and this material is limited; then take the unlimited amount of mineralised matter giving (say) only 4 ozs. silver, value 1*l.*, granting even that only 4 ozs. silver exist, nothing further is required but the aid of science and a little perseverance to concentrate the silver with the least possible cost. Yes, science is wanted, and will, now that a practical start has been made, no doubt soon be obtained. Men with brains are far beyond, in intellectual power, Barnard the persecuted as the heavens are above the earth, but after all, surely in the future, if a tear is not dropped from moistened

eyes when reviewing the past and present, and my frantic efforts to ascend the ladder of success, with always a hundred arms dragging me down, perhaps a few kind works may be allowed to flow from the lips of those who will have had their martyrdoms of mental and physical anguish removed by an elixir embrocation distilled and supplied from the non-diplomatic but herbal researches of the renowned and veritable M.D. Quack, THOS. J. BARNARD.

4, Abbey Mount, Tavistock, Dec. 16. ——

WHEAL VINCENT TIN MINING COMPANY.

SIR,—Some of my co-adventurers think it desirable that we should form a limited liability company to work this mine. I ask, why? My opinion is, in fairness and honesty to all concerned, that we have proved the mine a "failure." The south lode made tin to surface; our captain reported it to be of great value—20*l*. to 30*l*. and 40*l*. per fathom—but within a depth of less than 10 fms. we have come on the fearful hard red granite, similar to that which proved so disastrous in East Caradon and other mines. The result is the lode is split into scores of little strings, and in rock as hard as steel, and of no value. At the old engine-shaft the rock has changed in the like manner; from soft decomposed granite we are down on hard ground, the lode shallow. This was reported by our captain worth 40*l*. per fm., cost of stoping about as many shillings per fathom. What is the result? A continuance of heavy calls. And now we are at the 30 fm. level, with hard rock under, and a poor, small, worthless lode. Steam machinery here is an awful expense, but little short of 90*l*. per month, while all the lodes in the hard granite hills to the west are split up into numberless strings. I should be glad if Capt. Gifford would enlighten us on the present prospects of the mine. H.

Launceston.

GUNNISLAKE (CLITTERS).

SIR,—We have it reported that there is some improvement here at the intersection of the main cross-course near the engine-shaft, around which we have the most of our short deposits of ore, lasting a few fathoms only. Our great drawback seems to be the hard red glassy granite, in which ore of value is seldom found. I am guided by the long experience and advice of the late Capt. Henry James, who predicted so accurately the great fall in East Caradon from similar hard rock as we have in our mine. We have here what we may call a moderately deep mine—160 fms. Mr. Ennor will possibly enlighten us as to how much deeper the root of ore will last; we prove it to be short, therefore we hope for it in depth. And as we have spent over 10,000*l*. in steam-engine, steam-stamps, incline tramroads, burning-houses, dressing-floors, &c., most of which are thrown idle and of no use here, cannot our captains start a winze or two more, and also stopes from the ends of the winze? This has been our usual practice. We would have also extra points to report on, which would enable us to make a quick return of our ores.

Gunnislake. P.

NEW BRYNPOSTIG MINE.

SIR,—I am in the same position as your correspondent, "A. G." I took shares in this mine and paid the price for them—a considerable sum—in 1869, and paid calls afterwards, since which no account has ever been rendered or meeting of shareholders held. A company was got up under the Joint Stock Acts of 1862 and 1867, but the terms of the Acts authorising joint-stock companies to be formed having been utterly disregarded, it may be a question whether our money has not been obtained on false pretences, and the parties liable accordingly. Mr. J. Taylor, of Dudley, joined direction, but I learn that application has been made to him, and he answers no letters.

I enclose my name and address, and shall be glad to communicate with "A. G." or other shareholders who have been treated as I have, with a view to see what proceedings should be taken. C. B.

[For remainder of Original Correspondence, see to-day's Journal.]

MINING BY MACHINERY—No. III.

BY CHARLES BALL, C.E.

ROCK DRILLS—THEIR ADVANTAGES AND DISADVANTAGES.

The next machine we will mention is the Excelsior. This rock-drill is quite new, and appears to embody most of the improvements which the requirements of practical mining have shown to be needed in order to complete the solution of the problem. In this machine the whole area of piston is available for the pressure to act upon, and it can, therefore, work at a low pressure. It is simpler than any of the other machines, its valve gear being absolutely reduced to one part, or three if two small packing rings are reckoned separately. Instead of being a slide valve, an annular one is used, and this is moved directly by the piston, without any intermediate part whatever. This system also saves the necessity of the steam-chest, and thereby does away with one joint. It is obvious that in a machine of this kind, which has to be trusted to the rough hands of quarrymen and miners, the fewer the joints and delicate parts the better. A special feature is its automatic feed—that is to say, the arrangement by which the machine is made to follow its work as it progresses into the stone, without any intervention on the part of the workman. It is only fair to state that a similar arrangement exists in the larger size of the Burleigh system, but instead of being composed of very few parts, it entails in that machine the use of springs, levers, catches, and bolts, which are not, in our opinion, quite satisfactory, and have given, as far as our experience is concerned, a certain amount of trouble. Another point is the facility with which it can be carried from one place to another by one man, without, however, being too light. When a machine is too light the progress obtained in the rock is considerably diminished. The machine has a tendency to recoil from its work, instead of cutting the stone, and this inconvenience is particularly marked when the machine is working on a tripod, unless, of course, when it is attached to some permanent fixture, as a stretcher, bar, or similar arrangement. The simplicity of the arrangements of the Excelsior is such that the machine can be taken to pieces entirely and put together in about a quarter of an hour. Another feature is the particular way of attaching the tool or drill to the machine. A good length of the tool can be lodged within the machine, and when the rock-drill has bored the hole to a certain depth, so far as its arrangements will allow it to feed down, by simply releasing a cotter and winding up the machine the extra length which was hidden in the body of the machine comes into play, thereby enabling to put a hole a little over 3 ft. long without changing the drill. In all the other machines it is necessary to change the drill whenever the whole feed of the machine has been made use of, taking the tool out of the hole and putting in the longer one, and then getting its extremity to fit its proper socket in the machine, is a troublesome operation, and which generally entails the tilting and moving slightly of the machine. This leads sometimes to inconveniences, as the second tool does not find itself exactly in the axis of the hole bored by the first, and thus causes grinding, binding, and sometimes stopping. Lastly, the Excelsior drill possesses a peculiar feature, which is that it can be left to itself, absolutely alone, as it will not only feed itself down automatically into the rock, but will stop itself of its own accord when it has got to the end of its feed, the result being that one man can positively attend several machines, if they are not very far apart from each other, of course, very easily if they happen to be on the same stand, as in level driving.

The C machine in our list is another instance of the same principle, being carried out by different means. It is particularly light and handy; it is very well adapted for pit sinking and for quarrying work. It is self-feeding, and works particularly well, for 300 of them are at work on the Continent. With some 25 lbs. pressure it bores from 2 to 3 in. in such rock as hard limestone, trap, quartz, and lead ore per minute. All the machines which we have described till now have their valve actuated by a blow delivered by the piston, either to the valve itself or to some intermediate organ, which transmits the blow to the valve. All these machines work more or less satisfactorily, yet this striking action leads in all cases to wear, sometimes to breakages. The inconvenience is not excessive, and the broken parts can be very easily replaced if the proper duplicates be at hand; yet it generally entails in the Burleigh, and especially the Power Jumper, the breaking up of the steam-chest joint, and this inconvenience, which would be small when it takes place in a workshop, is sometimes very real when it happens half a mile underground, or at the bottom of a pit, and when the men who are working the machine, instead of being first rate fitters, are simply rough miners.

The machine which we will now describe, and which is a modification of the Mount Cenis machine, works on an entirely different plan, and the results which it has given have been most satisfactory. We have not described the Mont Cenis machine, because although it was one of the first made, and did actually carry through the Mont Cenis Tunnel, it is entirely antiquated and out of date, compared with the present machines, and especially with the modification of it which we are now going to describe, also because it is not in the market, as it is not manufactured any longer, to our knowledge.

The machine which we will now describe, the A of our list, is the invention of Messrs. Dubois and François: the former being chief engineer of large Belgian collieries, and the latter an assistant, from the beginning, of the celebrated Mr. Someiller, the engineer who directed the Mont Cenis works, and brought them to a successful issue. It was brought out in 1871-2, and is the most successful of all that have yet been tried, a great deal of this success being due to the practical knowledge of the two inventors, which enabled them to make this machine a real practical tool that could be used successfully in mining operations, and not merely a mechanical engineer's device. Its great advantages over all other machines are clearly shown by the fact that although scarcely a year and a half has really elapsed since the patent was first brought out, 240 of these machines are at work, and they appear to have been adopted generally by all who see them at work: 40 of them are at work at the St. Gothard's Tunnel, but a more significant fact is that 44 of them have been successively acquired, after a practical trial of the first sent, by one of the largest French collieries, the Anzin Company. Before such facts it is impossible to doubt that the machine is a most effective and efficient tool, and we are not aware that any other machine, be it the Burleigh, the Power Jumper, the McKean, the Kainotomon, the Excelsior, the C machine, or any other in existence, can show such practical proof of its labour and time saving power. The peculiar feature of this machine is that the valve instead of being moved by a blow delivered by the piston to it, or by any intermediate organs, is moved by the pressure of the compressed air used in working the machine, so that the motion is perfectly gentle, however rapid it may be, as it takes place through the intervention of an elastic fluid, instead of a metallic hammer. The result is obtained in the following way:—The slide-valve, which is of the ordinary (d) description, opens and closes the ordinary steam ports; but its motion is produced by the action of two pistons working in cylindrical parts of the steam-chest opposed to each other and of unequal diameter. These pistons are tied to the said valve by their rods. The pressure being admitted into the steam-chest, it will be easily understood that it will act in opposite directions on the two pistons, and the bigger of the two, having more power than its antagonist, will travel its own way, dragging after it the slide valve and the antagonistic piston, but this larger piston is itself bored with a small hole which allows the pressure to pass gradually behind it; the result of this action, which takes place in a very short time (a fraction of a second), is to paralyse the power of the big piston, which has scarcely started on its journey when it receives an almost equal pressure on its both sides, therefore annihilating all in its power, but as soon as this takes place the small piston, which is still exposed, of course, to the pressure in the steam-chest, gets the mastery over the big one, and pulls it back with the valve, thereby opening the other part of the rock-drill, and reversing the motion of the percussive piston. If matters stopped there the motion of the percussive piston would be stopped, as the pressure on the big piston being equal on both sides the small piston would keep the valve fixed in its extreme position, but the small capacity into which the big piston leaks, by the above-described hole bored through it, is closed by a small valve, which is kept in its position by a check spring. This valve, however, can be pressed down, and thereby opened, by the action of a lever, the long branch of which is so disposed and curved as to become tangent to the piston-rod of the rock-borer, or percussive piston. This piston carries an annular excrescence, or swelling, at a certain part of its length, and in the back stroke, which we have just described, this ball gets under the lever of the escape valve, and, gently pressing it up, it pushes down by the other arm of the lever the little valve, and the air escapes immediately through the opening thus afforded for its liberation. Immediately the bigger piston of the two valve pistons being relieved of its back pressure, recovers its mastery over the valve, and pulls it again in the original direction, and covering the top part of the percussive piston, and the pressure being admitted on it, sends it and the tool it carries against the stone to be perforated. From this description it will be seen that the forward and backward motion of the valve itself is produced by differences of equilibrium between two small unequal pistons, and the only connection of the valve gear with the piston is by means of a long lever, which receives no blow, but is slightly lifted out of its position by the swelling on the principal piston rod on its return stroke. This arrangement, which may at first appear somewhat complicated, and which we certainly considered to be complicated when we first saw the drawings of the machine, has proved in practice to work admirably. We consider that common sense requires the abandonment of any pet theory about the apparent complication of a machine that may have been formed, when it is clearly demonstrated by practical proof on a large scale that this complication is more apparent than real, and that the said machine works to the absolute satisfaction of everyone who employs it. The results obtained in current practice by the use of this machine in drifting (for it is especially employed for drifting), are such as, we are certain, have not been obtained by any other machine that we know of. At the colliery at Rouchamp, in France, a drift 7 ft. 6 in. by 7 ft. 7 in. was driven 237 yards from Jan. 1, 1872, to May 15, 1872, at the rate of 53 yards per month, the former progress by hand-labour not being quite 8 yards per month, it will, therefore, be seen in this case on an experience of four and half months the practical total result obtained by the use of machinery was to increase the progress almost sevenfold. In this present case, the works being new, the carrying on of this drift was not interfered with by the general work of the colliery, and especially as the rubbish could be taken out as quick as it was blasted down. In other cases the progress is somewhat hindered by the difficulty of getting rid of the rubbish, but on an average in a large number of places where this machine is in daily operation the progress can safely be reckoned to be three times that by hand-labour. The machines wear remarkably well, and generally do not come to light oftner than once in three or four months. The remarkable way in which they wear, and the absence of breakages in their use, must be attributed—firstly, to the absence of sharp blows, which interfere with the wear and tear of all other machines above described; and, secondly, also to the fact that they are manufactured by one of the best mechanical firms existing, that of Messrs. John Cockerill and Co., of Seraing; and the quality of the material employed, as well as the nature of the workmanship, cannot be praised enough. Taking into consideration the qualities and effects of the various drills which we have now described, and which comprise all those which are worth mentioning, we come to the conclusion that for drifting purposes the Dubois and François drill is the best that we can recommend. For other works, such as sinking, quarrying, &c., the choice would lay between the McKean and the Excelsior, the C drill being especially applicable for light work, and for such places where little space can be afforded to place the machine on its stand. The advantage of the Excelsior over the McKean being the somewhat greater simplicity, and its capability of working with a lower pressure.

[To be continued.]

COMPLETION OF THE HOOSAC TUNNEL.—The communication through the Hoosac Mountains, Massachusetts, was effected on Nov. 27. The work extends from the Hoosac river, at North Adams, Mass., on the west, through the Hoosac Mountain to the Deerfield river on the east, and when completed will open a new line of railway travel, by easy grades, from Boston and the northerly portions of Massachusetts to the Hudson river. The tunnel has a length of 25,031 ft. Its dimensions are 24 ft. in width and 20 ft. in height above the railroad track when laid, with a central covered drain 2 ft. square. The method of hand-drilling through the mountain, for a distance of five miles, made the job seem almost interminable, and calls were made for the invention of new and special machinery whereby the work could be expedited. This was in 1858. The ingenuity of the Yankee was not long in responding to the call, and in the course of a few months the contractors had the satisfaction of setting to work, against the face of the mountain, an enormous machine, composed of a great wheel faced with steel cutters, by which they expected at one operation to cut a finished tunnel of 25 ft. diameter in the most rapid manner. But in this they were doomed to disappointment. The machine began its revolutions, and cut its way into the rocks very nicely for a few feet, when it broke down, and gave such evidence of impracticability that it had to be abandoned. Slow progress by hand drilling continued until 1868. Other inventors had in the meantime succeeded in constructing new and improved drilling machinery of an effective nature, and in 1868 Messrs. W. and F. Shanly signed a new contract, guaranteeing to complete the tunnel by or before July, 1874. They set vigorously to work, employed the pneumatic drilling machinery, and have now successfully pierced the mountain. Their portion of the work will be finished in advance of the period fixed by their contract. The tunnel has cost—principal and interest—nearly 2,500,000*l*. to construct.

IMPROVEMENTS IN DRESSING MINERALS.

In the separation of metals, ores, or precious stones from the impurities with which they are associated it is at all times considered desirable to keep the dressed mineral as far as possible under the control of the agent or manager, and in the treatment of auriferous and argentiferous ores this arrangement is still more important. To facilitate such control a very compact and ingenious apparatus has just been invented and patented by Mr. ALEXANDER HEATHERINGTON, of Halifax, Nova Scotia. It consists of a rectangular chest or case, generally constructed of wood, and closed at its sides, ends, and top by strong doors, which can be readily opened or closed, and securely locked when required. Inside the chest a series of inclined planes is arranged one above the other, running from end to end of the chest, and sloping alternately in opposite directions. These inclined planes are made readily removable, and can be fixed at any required angle of slope, and their surfaces may be made so as to present a series of steps or corrugations, and with raised edges instead of being smooth, or they may be covered with blankets or hides, or made of copper amalgamated on its surface with mercury for the purpose of catching the particles of gold. The interior of the chest itself may also be lined with amalgamated copper plates for the same purpose, and the inclined planes may be made in two or more sets, divided by movable vertical plates similarly amalgamated.

The earthy matter containing gold or other precious metal, or precious stones, is admitted with a stream of water to the upper part of the upper inclined plane, down which it passes, then falling upon the head of the next, and so on until it escapes from the tail of the lowest through a narrow slit in the end of the box, having deposited upon the several inclined planes in its course the valuable substances it held in suspension. The effluent water may be led into settling pits, or allowed to pass away at once. By this apparatus a remarkably compact, portable, and efficient separator is obtained, possessing, moreover, the great advantage, where it is used for gold washing or amalgamating, that it may be safely left at work without superintendence, as the deposited gold is entirely inaccessible except to the possessor of the key by which the doors are locked. Of course, where ores of little value are being separated it is not necessary that the sides and ends of the chest should be closed in; but the apparatus is still of great value from its compactness and efficiency, and from the smallness of the space which it occupies.

The entering stream of water carrying the earthy and other matters in suspension is admitted through a grating (which can be locked down) arranged above the upper end of the highest inclined plane, and it may fall through this grating upon an inclined sieve, through which it passes before reaching the incline plane. The inventor prefers to fix his apparatus so that the discharge from a battery of stamps may be led directly into it, and the operations of stamping and separating thus become continuous; but these are, of course, mere matters of detail which would be arranged so as to adapt the apparatus to the particular mines and minerals for which it is used.

DYNAMITE EXPERIMENTS AT THE BARDON HILL GRANITE QUARRY.

On Monday last some exceedingly interesting experiments with Dynamite, as a blasting agent, were conducted at Messrs. Ellis and Everard's Bardon Hill Granite Quarry, near Leicester, in the presence of Messrs. J. Ellis, J. H. Ellis, Burdon Everard, W. T. Everard, J. B. Everard, Dr. W. H. Flores, the Rev. Mr. Allen, and others. The Bardon Hill Quarry is one of the largest and oldest in the neighbourhood, and is noted for the extreme hardness of its stone. The first truck load of stone for road making sent into London by rail was sent from this noted quarry. The stone which is being got out, according to an analysis made some three years ago, by Kirkcaldy, proves this granite to be the hardest in the country, which the following table will show:—

	Pressure on 1 square inch.	Pressure on 1 square foot.
Bardon Hill Quarry	Crushed at lbs. 20,742	Crushed at tons 1334
Mansfield ,,	19,090	1228
Mount Sorrel ,,	17,533	1128
Grimsby ,,	15,062	970

By the above it is clearly shown that of the four quarries Bardon Hill granite is by far the hardest, and it frequently happens that in this quarry 50 lbs. weight of powder is used at a blast, and on one occasion as much as 500 lbs. of powder was used at a charge. The stone got from this quarry is crushed by machinery into different sizes, and is much sought after for road and drive making, from the fact of its being so tough; it is also used for building purposes.

Mr. Thomas Johnson, of the firm of Johnson and Co., Trindle-road, Dudley, attended to conduct the experiments. As there was a good programme to go through the proceedings commenced early. Messrs. Ellis and Everard desired to see for the first experiment some large loose pieces of granite broken. These were detached from the solid, and lying at the bottom of the quarry, some of them weighing as much as 6 or 8 tons each. It is usual in breaking these blocks of stone by blasting-powder to churn a hole in 10 to 12 in. deep, and it often occurs in doing so the workman, in consequence of the excessive hard nature of the granite, loses the points of half-a-dozen steel tools in doing so. There were some seven or eight of these monster blocks of granite to practice upon with dynamite, and a hole was churned in each piece sufficiently deep enough to cover the cartridge, which were some of the smaller ones, 3¼ in. long by 1¼ in. in diameter. A single dynamite cartridge, primed with cap and fuse, was inserted into one of the largest of these blocks, a little clay being placed over it, so as to tack it to its place; the shot was fired, and when the visitors returned to the spot they were agreeably surprised at the execution done by one single cartridge, the piece of granite being shivered into fragments.

The next experiment was by breaking two of the pieces of granite by firing them together, to show how time may be saved by breaking the two at once. Consequently two of the largest pieces were selected by the party, and charged with one small cartridge each, a little clay being put over them. Both charges were fired, and there was only a quarter of a minute between the two reports, and on the party returning it was found that both pieces were broken to atoms, and tumbled in all directions.

The next experiment was what is usually known in the quarry as a heaving shot—a solid mass of stone lying at the bottom of the quarry that required blowing, or, in other words, heaven up, before other stone can be comfortably worked. In this solid mass a hole was drilled 1½ in. in diameter and 20 in. deep; a 1¼ in. cartridge was gently rammed home with a wooden rammer. The hole was then filled up with water, which seemed to surprise the visitors. The charge was fired, and the whole mass lifted up so that it could be conveniently loaded without the use of the sledge. Mr. Everard, one of the firm, said he felt highly pleased with this experiment, as he considered this the most difficult of all the experiments that had been tried.

The next experiment was a breast shot in the solid. A hole was bored in the granite some 12 ft. up the face, 4 ft. deep, and 2½ in. diameter. As this hole was by mistake put in 2¼ in. diameter instead of 1¼ in., and would not fit the 1¼-in. cartridges, Mr. Johnson loaded the hole with the loose dynamite out of six cartridges; the hole was then rammed up with sand, the charge was fired, and the whole layer of granite dropped; one of the visitors saying he should judge that there were 80 tons brought down by this shot. The next experiment was by throwing a cartridge against the rugged sides of the quarry, to show that dynamite will not explode by concussion; the cartridge simply struck bursted itself, and dropped like so much loose sand. The next, and last, experiment was throwing cartridges into a blazing fire which had been made in the quarry, to show that fire will not explode it, the consequence being that the dynamite mouldered away like so much cork burning. The list of

experiments having now been gone through, Mr. Everard, the senior partner in the firm, said they had 'had many experiments at the Bardon Hill Quarry with new inventions to take the place of powder, but in no case were they so successful as the dynamite.

Lectures at the Royal School of Mines.

ON HEAT.

In his fourth lecture, Prof. GUTHRIE dealt principally with the subject of "Latent Heat." It was as follows:—Resuming the subject of latent heat, the crude experiments which I showed you last time you must imagine to be developed with the utmost delicacy so as to establish the numbers set down in this table on the screen. I need not dwell on the methods by which they have been obtained, the method of mixture which I illustrated is, perhaps, the easiest to understand. In the case of gases, two units of comparison are used—hydrogen, which is, perhaps, the most scientific—and air, which is the most useful for experimental purposes, because it is so universal in its distribution. The comparison, however, between the results obtained by taking hydrogen as unit, and those with air as unit, is easily to perform if we once determine the specific heat of hydrogen and of air. With regard to this table of specific heats, one point is especially worthy of notice. Take all the chemical elements, whether solid, liquid, or gaseous, and determine their specific heats; then, multiplying the number thus obtained by the "combining weights," or "atomic weights" of the respective elements, we get a series of numbers, which present a remarkable equality. Considering all matter to be made up of atoms, the "combining weights" of the elements are nothing more than the weights of these atoms. The equality is so great that it approaches to identity, and the result of that supposed identity, granting that the non-identity is due to imperfection of experiment, or to the possibility of one and the same element occurring in different forms, as we know to be the case with phosphorus and sulphur. We are at liberty to assume the following as the most elementary fact:—That to heat an atom of any substance through the same number of degrees requires the same quantity of heat. Then you see that a substance like hydrogen, which has the lowest of all atomic weights, requires the greatest quantity of heat for any given weight to raise it to the same degree by the thermometer. Those bodies which have the highest combining weights have the lowest specific heat. If, therefore, we determine the combining weight of a body, we determine thereby its specific heat, assuming this law to hold good.

Now we come to latent heat of liquefaction and vaporisation. Imagine a cylinder into which we can pour any liquid—say water—a certain distance from the bottom; on the side of the cylinder is the opening into a small cistern, and higher up the side is a second opening into another and larger cistern. Now, if we pour water into the cylinder the level of the water will continue to rise till it reaches the first opening. At that level it will remain stationary till the lower cistern is filled; after that the level will go on rising till it reaches the second opening, when it will again become stationary until the second cistern is full. These cisterns find their examples in matter at the melting and boiling points. Take a mass of water (using the term in its broadest sense as including ice and steam) in the condition of ice below the freezing point of water. If you subject the ice to heat it will grow warmer and warmer till it begins to melt, then as long as any ice remains unmelted the temperature remains the same; the heat poured into the ice does not raise its temperature, but liquifies it. The melted ice (or water) in contact with the unmelted ice has the same temperature as the ice itself, and hence this temperature is taken as a fixed point on the thermometric scale. If we have a mixture of ice and water, by taking heat from it we do not lower its temperature, but cause more ice to be melted, therefore we have a large margin for equality of temperature. If now we take water and boil it—say we take a quart, and continue to boil it till it is reduced by evaporation to a pint—this pint of water is no hotter than was the quart when it first began to boil, and yet we have been continuously pouring heat into the water. Where has it gone? It has been employed in vaporising it. The heat of liquefaction and the heat of vaporisation, because it is hidden, as it were, is called latent heat. We will try to measure the latent heat of steam. I take 100 grammes of ice cold water, and pass a jet of steam into it till the water commences to boil—that is, until its temperature has been raised from 0°C. to 100°C., in doing which 10,000 heat units will have been employed. The steam passing into the water will be condensed, and in so doing impart its latent heat to the water. I will now weigh the vessel of water, and find it has gained in weight 20 grammes, thus proving that 20 grammes of steam, in condensing without cooling, have given off 10,000 heat units, or 1 gramme would give off 500 heat units. The number obtained by correct experiment is 536—that is, 1 gramme of steam in condensing gives out a quantity of heat sufficient to raise 536 grammes of water 1°C.

Now, to determine the latent heat of water, I will first take 200 grammes of water at 0°C., and pour into it 200 grammes at 100°C., and now I have 400 grammes of water at 50°C. Now I will take 200 grammes of ice, which is at just the same temperature as the water in the last case—0°C.—and pour upon it 200 grammes of water at 100°C., and after well stirring the mixture I find the resulting temperature not 50°C., but considerably lower—12°C.—because a considerable portion of the heat of the water has been expended in melting the ice, and not in warming it. The 200 grammes of boiling water then have sunk through 88° centigrade, so that there have been expended 200×88=17,600 heat units; they have melted 200 grammes of ice, and raised it through 12°. Substracting 12×200=2400 heat units, which were employed in heating the melted ice, we have left 15,200 heat units as due to the liquefaction of the ice. For the melting of 1 gramme of ice, therefore, we require 76 heat units (more correctly, 79). Closely connected with the determination of latent heat of liquids and gases—or rather, in fact, identical—is the relation subsisting between the three different forms of matter, and the heat which either determines the change or keeps the bodies in that particular state. Let us also bear in mind these two distinct attitudes. We may be active in supplying or withdrawing heat, or we may be merely observant when heat is given out or absorbed. Heat is required for a solid to be transformed into a liquid, and for a liquid to be transformed into a gas; on the other hand, if you abstract heat from a gas you liquefy it, and if from the liquid you withdraw heat, you solidify it. With regard to ourselves as the active agents in these operations, the examples are manifold. It will, perhaps, be more instructive if we consider ourselves the passive observers, and examine the thermal effect when one or other of these changes takes place. Let us take the case of the passage from the solid to the liquid condition, and in this case it is not necessary to apply heat to liquefy it; we will take some salt, which will dissolve in the liquid. I will surround each of the bulbs of the air thermometer with a basin of water at the same temperature, and now in the water of one basin I will dissolve some sulphate of soda, or Glauber's salt. By the passage of the salt from the solid to the liquid state heat is absorbed from surrounding bodies; in this case from the water and from the one bulb of the thermometer, which instrument shows at once that this basin of water in which the salt has been dissolved is colder than the other. When any salt dissolves in water, or sugar even, it produces cold, as we generally say (though we know there is no such thing as cold), but in reality it abstracts heat. When a liquid is transformed into vapour, heat is again absorbed. For example, I get into a bath as hot as my own body, and get out again. I find after the lapse of a few minutes the water evaporates, or passes off as vapour, and I feel cold: here I take some ether, and pour it upon the bulb of this air thermometer; it instantly begins to evaporate, and diffuses through the air, but as a gas it requires more heat than it did as a liquid, and this heat it draws in the first place from the glass of the bulb, and then from the air in the bulb; the air, therefore, contracts, and the liquid rises up the tube. In becoming condensed a gas gives out heat. For example, I pass this current of steam against a cold porcelain basin: the steam is condensed on the cold porcelain, which soon becomes warm. The sodic sulphate we used in a former experiment has this property in common with some other bodies; if we take a solution of this salt at a certain temperature, and then heat the solution, we shall be able to dissolve more of the salt in the liquid. Most salts in such a case crystallise out as the liquid cools, but this sulphate of soda, if we take the precaution to keep it from pieces of dirt, &c., which are floating about, will remain dissolved in the water when it cools, although there is more salt dissolved than the water can retain under ordinary circumstances. Now, if I dip my finger into this "super-saturated" solution, or disturb it in any other way, it begins to solidify instantly, and is nearly a solid mass already. Now, I want to show you that this liquid in solidifying gives out heat. Here is a jar of water and a jar of this super-saturated solution, both at the same temperature—the temperature of this room. I will pour the water into this basin, surrounding one bulb of our differential thermometer, and into a similar basin round the other bulb I will pour quickly this solution, and the movement of the liquid in the thermometer shows the bulb in the latter case to have been heated more than the other. One of the most striking examples of the absorption of heat by a liquid when passing into the gaseous state is presented by liquid carbonic acid. Here we are forming some of the gaseous carbonic acid by the action of sulphuric acid on marble, and you see it is a transparent, colourless gas. Supposing, now, we were to force the particles of this gas together, or withdraw all the heat from it by means of freezing mixtures, it would become liquid, but at 10°C. would require a pressure of six or seven atmospheres; this has been done in this strong iron cylinder. This liquid, on being allowed to escape into the air, becomes at once gaseous, and in doing so absorbs heat from another portion of the liquid, and transforms the latter into solid carbonic acid, a body exactly resembling snow, which, although intensely cold, I can take up in my hand, because the large quantity of gas escaping from it prevents the solid really coming in contact with my hand. But if I put some uncongealable substances, as ether, with it, the pasty mass will produce a great degree of cold, sufficient, as you will see, to freeze mercury.

I can freeze the water in this glass tube by plunging the tube into what is called a freezing mixture. You know that salt put in contact with water dissolves in the water, which shows that the solid tends to become liquid. Supposing we take a mass of salt and bring it in contact with a mass of ice, the tendency of the salt to dissolve in water will cause the ice to melt before it can dissolve, and thus here we have two causes acting together to abstract heat, two solids which are being liquefied, and they abstract a large quantity of heat from any body with which it is in contact. This is another means for producing cold—by removing pressure from a liquid. You remember the pressure of the air is about 15 lbs. on the square inch. That force is exerted on the surface of liquids, and restrains them from passing into the gaseous state. This instrument consists of two bulbs connected by a glass tube; the whole is hermetically sealed up. This instrument contains only water and the vapour of waters, for it was sealed up while the water was boiling, and, therefore, after the air had been expelled. I will remove the vapour of water in this bulb by placing it in a freezing mixture, more vapour will be formed from the water in the other bulb, and the process will go on till at length sufficient heat will have been withdrawn from the water to freeze it. By cooling this bulb, then, we freeze the water in the other; that is, the cold has been, as it were, conveyed thither from this freezing mixture, hence it has been called a "cryrophorous." It might be better called a "pyrophorous." When liquids are exposed to the air they are subject to three forces.—1. A distinct tendency for the liquid to pass off as vapour into the air, a diffusive tendency.—2. The pressure of the air restraining such rise.—3. A force which assists the pressure of the air, or which acts against the diffusive tendency—the force of cohesion. In the case of a stoppered bottle, for instance, these three forces are in equilibrium, but we can disturb this equilibrium in many ways. We can heat it, for instance, and if we suppose, in the first case, the liquid to be made up of a number of particles, we may imagine the effect of the heat to be to drive these particles further asunder—*i.e.*, to diminish the cohesive force. At present it has not been determined how far this supposition is real fact, or how much true philosophy. The tendency to pass into vapour is called the vapour tension, and this can be accurately measured by the effect the vapour has in depressing the mercury column.

MANCHESTER GEOLOGICAL SOCIETY.—The opening meeting of the session will be held on Tuesday, when the president, Mr. Thomas Knowles, of Ince Old Hall, Wigan, will make his inaugural address, after which Joseph Dickinson, F.G.S., Ispector of Mines, will exhibit and describe some of the saliferous marls and maristones obtained during an inspection into the causes of the landslips in the salt district of Cheshire.

MINERS' ASSOCIATION OF CORNWALL AND DEVON.—At the last meeting of the Geological Society of London, Mr. Benedict Kitto, the lecturer of the association, was elected a Fellow of the society. At the previous meeting a former pupil of the association, Mr Henry Francis, was elected a Fellow.

THE SLATE VEINS OF CWM TRWSCWL AND BLAEN-Y-PENNANT, CARNARVONSHIRE.

For some time past the valuable slate veins beneath the estates of Cwm Trwscwl and Blaen-y-Pennant have been extensively worked and opened out, but owing to the absence of ready means of communication with Portmadoc it was found impracticable to get the slate to the shipping port for less than 12s. per ton; now, however, that the Gorsedda Junction and Portmadoc Railway (for which a Special Act was recently obtained) is being constructed by an independent company and rapidly approaching completion, whereby the cost of carriage will be reduced to 2s. 6d. per ton, no doubt is entertained that the profits of the company will be very laage. In order to be prepared for the more extensive development of the property by the time the line is opened, the company owning it—the New Prince of Wales Slate Company—are inviting subscriptions for 200 Ten per Cent. First Mortgage Debentures of 50*l.* each, to be issued at 47*l.* 10s. per debenture, redeemable at par at the expiration of three years, or previously upon giving three months notice. The security for the debentures is a property nearly one mile in length, and upwards of two miles in breadth, which is held for an unexpired term of 31 years; and the quarries which are situated upon it have been very extensively developed at an outlay of upwards of 25,000*l.* They are provided with every requisite in plant and machinery for carrying on the most extensive business. Two inclines, with connecting railway, together three-quarters of a mile long, have been constructed, and the buildings and sawing and planing machinery are of the best and most improved description. There are also barracks, with every requisite for the accommodation of at least 100 workmen. Eight galleries, each 18 yards in depth, and altogether 800 yards in length, have been opened, and can be worked to an extreme depth of 300 yards without any lifting power whatever; the tip for rubbish is unlimited, and there is ample water-power for sawing and planing at all seasons. Several thousand pounds worth of slates have already been sold, and slabs, of which there are a large number now on the quarry, manufactured and untured, can be supplied to any extent, and of the largest sizes.

In the process of opening out the quarries the company, which has a share capital of 50,000*l.*, the greater part of which (35,000*l.*) is issued, has acquired adjacent property necessary for the successful carrying on of the business; this comprises an extensive machine-house full of first-class machinery, which alone cost 10,000*l.*; upwards of 210 acres of land, part of which is freehold and the remainder held for an unexpired term of 800 years free of rent; including the Gorsedda Quarry, a manager's house, and 36 cottages. The machinery and premises being on the main line of the railway, will be utilised by the Prince of Wales Quarry, and the remainder of the property can either be leased or sold at a large profit. A very valuable vein of slate (estimated at a mile in length and 300 yards in breadth) has been discovered on the company's property, near the Cwm Dwyfor Mine, the company for working which pay a royalty of one-fifteen to the New Prince of Wales Slate Company. These mines are of a highly promising character, they are being vigorously worked, and a large quantity of ore has been already raised. There is no doubt that the royalty will very shortly be yielding this company a considerable revenue.

The summarised valuation of the company's property amounts to 75,000*l.*, in addition to the royalties from the copper and silver mines of the Cwm Dwyfor Company and the rents from farms and other lands, and as it is stated that the principal object of the issue of debentures is to enable the company to pay off the balance of the purchase-money of the rents and royalties originally existing on the property, and charges affecting the same, the operation will place the concern in an exceptionally advantageous position, whilst with regard to the quarry itself it will suffice to refer to the report of Mr. Thomas Trevithick, in which he remarks that to attempt a description of the Prince of Wales Quarry, embodying all its elements of quality and quantity, would be superfluous; suffice it to say that a better is not to be seen, and that more first-class slates can be made from galleries nearest to the surface in this quarry than in any other quarry he has ever seen. The facilities, too, for tipping the debris are unusually great, as the vast hollow in the mountain side will be available for generations yet to come. The prospectus will be found in another column.

THE CHANNEL TUNNEL.—Although the French Commission on the project of a submarine tunnel between France and England decided at their meeting on Sunday last (when many delegates, engineers, &c., were present) that the establishment of a submarine railway between the two countries should be declared a matter of public utility, the discussion by the Institution of Civil Engineers of Mr. Prestwich's paper on "The Geology of the British Channel," has demonstated beyond the possibility of question that commercially such a project could not prove advantageous or remunerative. The president of the Institution (Mr. Thomas Hawksley), Professor Ramsay, Sir John Hawkshaw, Mr. Bateman, and others took part in the discussion, and the opinion appeared to be unanimous that the geological aspects of the case were not encouraging. The London clay beds, involving a distance of 100 miles from shore to shore, along a curved line, which in itself would be a serious engineering difficulty, met with no favour. The Kimmeridge clay, with the possibility of its uncomfortable union with the Weald clay, was not looked upon as much more hopeful; whilst the depth—probably 1000 ft. or more—of the Palæozoic rocks, in which the author of the paper considered there was the best prospect, involved a ten miles descent in the land on either side of the Channel to and from the tunnel. But the geological objections are altogether insignificant compared with the commercial objections. Even assuming the railway to be constructed and kept fully in operation night and day, and to carry freight and passengers at the highest possible rate that could be charged in face of the competition of the oversea transit that would have to be met, it would be impracticable to earn sufficient to pay 1 per cent. per annum interest to the capitalists, if any were found thoughtless enough to sink their money in the project. It was pointed out by one of the most competent members of the Institution of Civil Engineers that the required traffic could not be hoped for. It was, moreover, remarked that of a tunnel under the Straits of Dover would probably cost 40,000*l.* a year for ventilation alone, and that, taking the cost of the tunnel at 10,000,000*l.*, it would require a gross traffic of 1,200,000*l.* a year to make it pay commercially, or 824*l.* per mile per week. The largest known traffic—that on the Metropolitan Railway—realises 1000*l.* per mile, so that the traffic between Dover and Calais must be as busy as that of London itself to make any tunnel answer; or, compared with another most prosperous railway, the traffic under the sea must be five times that of the Lancashire and Yorkshire, eight-and-a-half times that of the London and North-Western, and thirteen times that of the Great Western, before any suitable dividend could be paid. Henceforth then the idea of constructing an Anglo-French tunnel as a commercial enterprise must be regarded as Utopian.

UTILISATION OF TIDES.—Some time since reference was made in the *Mining Journal* to the invention of Mr. Tommasi, for utilising the power of tides, and it is now announced that a company has been formed in France for utilising the tides on the coast by machinery. The first experiment is to be made at St. Malo.

A BIRD WITH TEETH.—In the London clay, at Sheppey, Prof. Owen has just discovered a new fossil bird with teeth, somewhat resembling those in the Australian hooded lizard. He concludes it to have been web-footed and a fish eater. No evidence of true teeth had previously been known in any bird.

Meetings of Public Companies.

PRUSSIAN MINING AND IRONWORKS COMPANY.

The ordinary general meeting of shareholders was held at Düsseldorf, on Dec. 6,—Mr. WM. T. MULVANY, President, in the chair.

The usual preliminaries having been disposed of, and the meeting declared duly constituted, the directors' report and statements of accounts were submitted. The audited accounts to June 30 showed a net profit of 355,617 thlrs. 1 sgr. 1 pf., equal to about 53,342*l.* 10s. A dividend for the business year 1872-73 was declared on the first five series of shares at the rate of 3*l.* 18s. per share; of this 3*l.* already been paid, and the remaining 18s. is payable on Jan. 2. The formal announcement will be found in our advertising columns.

The report of the direction stated that the business year 1872-73 commenced under very favourable auspices for both the coal and iron industries—the only drawback at that time being the unsettled state of the labour market—especially in the coal district, the Essen strike being just then in progress, which, although it did not directly extend to the collieries of this company, caused an irregular attendance and unsatisfactory performance of the men. The strike came to an end in July, since which time there has been no general disturbance amongst the colliery workmen, but there has been a great advance of wages and of the price of task work, which has been accompanied by a diminished performance on the part of the men, and the consequence is, of course, a very large increase in the cost of production. The selling prices of coal, coke, and iron, however, increased in a still larger proportion up to the close of the business year in June last, when they had attained a height hitherto unknown. Since that time the coal prices have risen still higher, and the contracts entered into for next year are at even higher rates than those for the present semester, the demand for all sorts of coal being still very great. The coke prices have reached to a point more proportionate to the coal price than they were some months ago; and the prices of pig-iron, which had risen rapidly in this year to a point certainly out of proportion even to the increased prices of coal and coke and iron ores, have fallen gradually within the last few months to about the same level at which they stood before the great rise in the prices of those raw materials, and, consequently, as much below a reasonable standard as they were at one time above it. It cannot be expected that such a state of affairs can long continue, and it may be expected that when the consumers of finished iron of all sorts come upon the market with the orders for their future requirements, with which they have been holding back for some time, a more wholesome state of the pig-iron trade will show itself, with renewed activity and fairly remunerative prices.

The additions to the possessions of the company made by the direction, with the sanction of the council of supervision, have been:—

(*a.*) The Teutonia Hütte, near Willebadessen, in Westphalia, with works for one blast-furnace, about 240 acres of land and wood, very extensive oolitic iron ore mines, and a junction with the Westphalian Railway between the stations Bonenburg and Willebadessen.

(*b.*) The brown hematite mines, Wolfsteig, Emil, and Sperrweg, near Waltershausen, in Thüringen.

(*c.*) Extensive concessions of the brown iron ore known as the "Vogelsgebirge" ore, near Grünberg and Weitershain in Oberhessen.

(*d.*) The valuable hematite iron ore mine Eisenberg, near Olsberg, in Sauerland, together with 1-5th to 1-6th part of the similar mines Grottenberg and Enkenberg, near Brilon.

(*e.*) A 10 57th part of the spathose iron ore mine, Alte Flussberg, near Siegen; and

(*f.*) A mine of magnetic iron ore, named Quinherrid, at the Hardinger Fjord, in Norway.

These iron mines, together with those already in the possession of the company, secure to it an ample supply of ores of nearly all qualities required for their blast-furnaces, and for all classes of iron, except the speciality of the so-called Bessemer pig iron, for which a class of ore is requisite which heretofore has, with one exception, not been found in sufficient quality and quantity in any of the formations in the country.

Considerable acquisitions of lands have also been made at hand near the sites of all the works, a large number of officials' houses, workmen's houses, and barracks, with *menage* erected, as stated in detail under the head of each work; and about 13,000,000 bricks have been made on the lands of the company for the building purposes of the present and of next year.

Of the 75 railway wagons ordered in Belgium in the month of March, 1872, as mentioned in the last yearly report, the last lot of 16 were not delivered until the month of May of this year. The company is now in possession of the whole number, 65 wagons of 10 tons, and 10 of 15 tons capacity, and is thus to a great extent secured against the danger of the railway companies failing to supply the necessary wagons for the transport of the raw material between the collieries and the iron mines on the one hand and the ironworks on the other.

In accordance with the resolution of the extraordinary general meeting of March 28 last, the amount of the premium received upon the issue of the new shares has been applied in the first instance to the completion of the statutory reserve fund up to the full amount of 10 per cent. upon the whole of the share capital, old and new, that is to the sum of 300,000 thlrs. The balance of 263,915·10 thlrs. has been, also in accordance with the resolution of the general meeting, carried over to a special reserve fund. According to the wording of the resolution this special reserve fund is to be treated as a renewal fund. It appeared, however, to the direction, that inasmuch as this fund has been created out of profits in the course of issue of new capital, it is only right to write off therefrom the amount of loss in the course of issue of obligation capital which has hitherto figured on the active side of the balance-sheets under the head of "reserve account for priority obligations," and which has been partly written off by the amount of the partial obligations amortised each year. The council of supervision having concured in the correctness of this view, subject to the consent of the general meeting, the balance-sheet has been made out accordingly, showing a balance still remaining of this special reserve fund of 131,207·10,thlrs., which if approved of by the general meeting, it is intended to apply, in a similar way, as far as it shall reach, to cover the loss of course in the issue of the partial obligations of the second emission. The report also contains very complete details as to the position and prospects of the several properties, all of which appear to be in a very satisfactory condition.

Messrs. Wm. T. Mulvany, Düsseldorf, president; H. C. Cruys, Amsterdam, vice-president; H. Bewley, Dublin; E. Pike, Cork; Wm. Conrad, Berlin; W. Meckel, Elberfeld; J. H. Bainbridge, and J. S. Forbes, London; and Gustav Arndt, Düsseldorf, were appointed the council of supervision.

Sixty-nine of the Partial-Obligations (the numbers are advertised) were drawn, and will be paid on and after July 1. The shareholders are reminded of the calls due on the 6th, 7th, and 8th series of shares.

LADY CONSTANCE LEAD MINING COMPANY.

The first ordinary general meeting of shareholders was held, on Monday, at the Clarence Hotel, Manchester,

Mr. R. C. SHARP in the chair.

Mr. BATES CRITCHLOW (the secretary) having read the notice convening the meeting,

The CHAIRMAN said—You are probably aware that this meeting is called more to comply with the Act of Parliament relating to limited liability companies than to bring any important matters of business before you. In a meeting of this kind we can really have little or no reports or accounts to lay before you. I do not suppose that I shall have any necessity to detain you for any great length of time, but it is my pleasing duty to inform you, and as, no doubt, most of you are perfectly aware, that we, as a company, have been in possession of the mine for just four months, and I am happy to say that, so far as we have gone, we have every reason—yea, very great reasons—to be more than satisfied. I can most heartly congratulate you on being in possession of a property that bids fair to eclipse even your most sanguine expectations. The samples of ore now on the table I believe will fully prove to you that even now, in our infancy, we are showing more vitality than many mines in their full vigour of health and manhood. Your directors have, therefore, much pleasure in meeting you to-day, and in being able to tell you that the progress made up to the present time in carrying out the objects for which the company was established has been most satisfactory. If you will permit me, I will give you some particulars of the mine from the time the company took possession. I may say these particulars will be from the personal observations made on the spot by your directors. On Aug. 23 we, in company with several other gentlemen, visited your property, most of us descending into the workings, and am happy to believe I was the first person to cut into a celebrated lode, called Chwarel-las; this lode is now being developed. About 14 days after this we again visited the workings, and we found that the men were busy clearing out and repairing the old level which had fallen in, and at the same time sending up good ore to the surface. We have several times visited the workings since, and have each time found the mine looking better. Up to Nov. 1 we had only a few men at work, so that they could not make any great headway. However by that time we found the sinews of war coming in pretty freely; we, therefore, felt justified in launching out and working in a more efficient manner. More men were put on in the workings, and others were put to work to construct the dressing-floors, and make a trench for feeding the same with water. The result has been that in our first month of real work we have done what I venture to say scarcely any other mine at present in existence has done—that is, dressed, prepared, and actually sold 15 tons of ore; and if it were not for the crude mode of dressing I say we should have doubled, or even trebled this, for we have on the surface a very large quantity ready for dressing. At the same time that we have been doing this we have been sinking the engine-shaft, which we hope by this time is now complete, and when the engine-house and engine are erected it is fully expected we shall be able to open out a junction of highly metalliferous lodes, when I firmly believe that your property will be second to none. I do not wish to anticipate in too sanguine a manner what the profits will be, nor would it be wise on my part to do so, but I believe, so far as we can at present see, that they will be such as will give you the highest satisfaction. The directors, therefore, are convinced that the company has acquired a very valuable property, which it will be their object to develope, and they trust that when they have again the pleasure of meeting the shareholders to be able to confirm this opinion by the declaration of a most substantial dividend, which at the present rate may shortly be expected. In consequence of the high rate of interest that money lately reached, rates almost unprecedented, shares to a great extent have ceased to be taken up. To put down new and improved dressing-floors and machinery we shall require for the really successful working of the mines a further sum of 3000*l.* to 4000*l.*, and I must appeal to you to increase your interest until such a sum is raised.

The SECRETARY then read the report of the committee of inspection, which appeared to give the greatest satisfaction.

The CHAIRMAN again rose, and stated there is no further business to transact to-day, but if any gentleman wished for information upon any point the directors would be happy to give it.

A SHAREHOLDER: Have you not amalgamated other sets with the Lady Constance?——The CHAIRMAN: Yes.——A SHAREHOLDER: Then I suppose some of the capital is required for this purpose?——The CHAIRMAN: Yes, I believe 4000*l.* will cover everything.——A SHAREHOLDER: When may we expect a dividend?——

The CHAIRMAN: Early in the year. (Hear, hear.)——A SHAREHOLDER: Have you bought an engine yet?——The CHAIRMAN: Yes, and it is now being put down. ——A SHAREHOLDER: Is it paid for?——The CHAIRMAN: Yes, certainly, and everything else on the works.——A SHARHOLDER: What power is the engine? ——The CHAIRMAN: Fifteen-horse.——A SHAREHOLDER: Is this sufficiently powerful?——Capt. WASLEY: Yes, for the southern end of the mine.——A SHAREHOLDER: What is the captain's opinion of the mine?——Capt. WASLEY: Your property is certainly one of the largest setts in the kingdom, and is a most desirous property; and my opinion is such that I myself intend to take considerable pecuniary interest in it. (Hear, hear.)

The CHAIRMAN: You have heard the report of the committee of inspection, and I must ask you, as shareholders, whether it is wise on your part to allow such a property to be hawked as it were about the country. Would it not be wise and prudent to keep the shares in as few hands as possible? I am sure that it is a step that none of you will ever regret, and I do not hesitate to state that so soon as the share list is finally closed the shares will command a good premium. However, you have now heard the progress the company has made, you see what our real prospects are, and it is for you to determine whether or not we are to languish for want of capital.——Mr. MEREDETH, one of the directors, in answer to a question as to the quantity of ore which was ready for dressing, replied that it was difficult to say, as it was at present mixed with a large amount of debris, but it was variously estimated from 50 to 100 tons.——On the motion of Mr. JAMES H. REDFERN, seconded by Mr. SHAW, the secretary was instructed to issue circulars to the shareholders, requesting them to subscribe the necessary capital.

A vote of thanks was moved to the Chairman by Mr. JOHN COOPER, of Oldham, and seconded by Mr. THOS. HARGREAVES, of Manchester, and carried unanimously.

EAST CHIVERTON MINING COMPANY.

A general meeting of shareholders was held at the offices of the company, Gresham-buildings, Basinghall-street, on Thursday, Mr. GODDARD in the chair.

Mr. G. SHARP (the secretary) read the notice convening the meeting, and the minutes of the last were confirmed. The accounts showed a debit balance of 29*l.* 15s. 3d.

The report of the agent was read, as below:—

Dec. 17.—It is with much satisfaction that I submit particulars touching the state and prospect of this mine, and the progress made in its development in the past 12 months. The engine-shaft, which is a perpendicular one, is sunk to the 64 fm. level, and all the necessary work for drawing the ore and stuff to surface completed. A cross-cut has been driven south at the bottom of the mine 3 fms. 4 ft. 6 in., and intersected the lode, and 18 fms. 1 ft. 7 in. driven west on its course, varying in size from 2½ to 3½ ft., and producing in places good stones of silver-lead, presenting altogether a much better appearance than in the level over. There is about 20 fms. to drive to reach the lead ore ground, getting very good silver-lead ore, which is greatly assisting in paying the cost of the mine. In the past four months we have sold from this stope 27*l.* 18s. 5d. worth of silver-lead, the cost being as follows:—Raising 4*l.* 10s.; dressing, 2*l.* 8s. 1d.; carriage, 2*l.* 4s. 8d.; total, 6*l.* 2s. 9d. Showing the profit of this stope to be 20*l.* 15s. 8d. It must be remembered that no longer back than 12 months our present engine was only partly erected and the mine full of water, and that, too, in a very wet winter. Since then we have completed the erection of the engine, together with a good deal of building and requisite surface work, having also gone down in the bottom of the 52 fm. level, which will take, supposing the ground continues the same as at present, from three to four months. No time will be lost in putting up a rise to communicate with the upper level, for getting good ventilation, which being done, we shall commence stoping good lead ground. We are pushing on the bottom level with all possible dispatch towards the point named, by six men, at 2*l.* 1s. per fathom. At the 52 there are two ends driving, one east of the shaft the other west. The former, you will see by my last report, I attach very much importance to, the character of the lode being such that good discoveries of silver-lead ore are daily expected. The end, as shown by the section, is driven east of the shaft 12 fms, the lode in which is fully 3 ft. wide, composed of quartz, blende, mundic, and some very good silver-lead ore. In the last 3 fms. driving plenty of carbonate of iron has also made its appearance, which is the best indication for the lode making a good course of silver lead. This end is driving by a full force of four men, at 40s. per fathom, and you will see by the plan that it is in entirely unwrought ground, of which we have before us nearly 300 fms. The lode has gradually improved since we commenced driving this level. In the back of the 40 there are four men stoping, and we have sunk the engine-shaft 12 fms.: stoped and driven 106 fms. 3 ft. 6 in. of ground, raised and sold ore to the value of 27*l.* 18s. 5d. I have dialled the workings up to the end of last month, and laid the same down in the plan and section, by which shareholders can see what we are doing, and the objects we have in view. In conclusion, I will only add that my confidence in the successful issue of this mine is as great as ever.—RICHARD SOUTHEY.

The accounts were passed and allowed, and, with the report, entered upon the minutes.

Capt. SOUTHEY, in reply to a question, stated that he attached great importance to the eastern portion of the sett, where there were 300 fms. of ground. There was a little lead in the end, and it was a beautiful-looking lode. In six months hence it was quite probable a valuable piece of ground would be opened in that direction, and if the lode in the 64, in the western ground, proved of the same value as that in the upper level, it was quite possible sufficient returns would be made from that one point of operation to pay the whole cost of the mine.

A SHAREHOLDER said that in June last he visited the mine, when he found that, although it had been working for 10 or 12 years, the operations had never been extended upon the lode until the management was placed in the hands of Captain Southey, now some 12 or 15 months since. The developments now being made seemed likely to lead to an early success.

Capt. SOUTHEY, in reply to a question, stated that the ore realised an average price of 5*l.* to 6*l.* per ton above that from the mines in the neighbourhood. The eastern drivages were being extended at the rate of about 8 fathoms per month. He calculated upon being able to raise about 300*l.* worth of ore between now and the date of the next meeting.

A call of 2s. 6d. per share was made.

A vote of thanks to the Chairman closed the proceedings.

MELINDUR VALLEY SILVER-LEAD MINING COMPANY.

The statutory meeting of shareholders was held at the London Tavern on Tuesday.—Capt. WALDRON CLARKE in the chair.

The notice convening the meeting was read.

The CHAIRMAN said the meeting had been called in compliance with the Act of Parliament, which prescribed that the meeting should be held within four months of the registration of the company. The directors gladly availed themselves of this early opportunity of meeting their constituents to congratulate them upon the possession of a mine of unusual merit, and at the same time to afford any information required. Beyond the evidence adduced by the various eminent authorities who had inspected and reported upon the property, they had the testimony of one of their colleagues, who had just returned from a personal inspection of the mine, and whose report would be submitted to the meeting in due course. One of the special features of the mine, which was of incalculable importance now that coals were so high in price, was the fact that it had an abundant supply of water for all requirements; and another feature was that the mine was surrounded by the most established and richest mines in the Principality, neither of which at a corresponding stage of development presented such indications of success as those now apparent in Melindur Valley. With such data before them it was altogether unnecessary for him to further refer to the merits of their enterprise, therefore all he need say was that the directors would give their best attention to ensure the prosperity of the company, so as it should occupy no mean position among the most profitable mines in Wales. He would now ask Major Boyle to give to the meeting the result of his personal inspection.

Major BOYLE said: Having been deputed by my co-directors to visit the Melindur Valley Lead Mine, I reached it on the 12th in company with Capt. Kitto. I saw that the various statements made to the directors by the vendors and promoters were correct, and the machinery mentioned in the prospectus was there, and in excellent preservation, the only exception being a portion of the shaft which needs repair. The cost for this will be, I am informed, about 40*l.* to make it good. The entrance to the adit will require to be raised for a short distance, at a cost of 100*l.* To put everything in perfect working order, I am told, will cost under 300*l.* I remained for a considerable time underground and visited every part of the mine and carefully inspected the various lodes, and saw considerable quantities of ore, which had been broken the day previous to my arrival. Capt. Paul, one of Messrs. J. Taylor and Son's confidential agents, who was with us, directed my attention particularly to a driving in a north west direction from the adit level, it is at present little more than commenced, but he and other experienced men consider it certain that before very long the lode will be cut, and as it seems the universal opinion that it is one of the richest lodes on the property, I cannot too strongly direct your attention to it. The working of the mine can be economically carried out, as there is water-power enough for all purposes and at all seasons.

A SHAREHOLDER asked the percentage of silver contained in the lead extracted from the mine?——The CHAIRMAN said the ore had given an assay value of 32 ozs. of silver and 21 per cent. of lead per ton, which he understood was far above the average yield from the surrounding mines.

Capt. KITTO, in reply to questions from different shareholders, stated that he had so fully entered in his report into the position, prospects, and merits of the property that little, if anything, was left for him to add. He had visited the property several times, and on each occasion had been more fully impressed with its great value. As the Chairman had stated, it was surrounded by several of the best and largest dividend-paying mines in the Principality; and he could see no possible reason why, when fully developed, it should not prove equally profitable as those famous mines. With regard to the facilities for its development, they could scarcely be surpassed—it had not only the water that was available in the adjoining mines, but also that which was pumped to surface, yielding an ample supply for all possible requirements. There were three or four distinct bunches of ore already discovered, but being at so shallow a depth, only a few fathoms from surface, courses of ore could not be looked for; but considering the extent and character of those several bunches, no reasonable doubt could be entertained that at an increased depth highly satisfactory results would be realised. He believed Melindur Valley would turn out to be a most valuable property, and that in a comparatively short time, and upon a very limited expenditure of capital. Capt. John Williams, one of Messrs. John Taylor and Sons' confidential agents, who was present, who having been connected with the mines of the district 32 years, would be able to answer any question as to the district more satisfactorily than he (Capt. Kitto). All he could say was that development only was required to establish Melindur Valley one of the notable mines of the district.

Capt. WILLIAMS said he had been connected with these mines about 30 years. Melindur Valley among them was called a little pet mine. He was a shareholder when it was last worked, and remained so until operations were suspended for want of working capital. He had no hesitation in saying that its general indications were in no respect less encouraging than those in Cwm Erfin at a similar stage of development. It immediately adjoined Cwm Erfin, which had not only returned to the shareholders the whole of the capital subscribed but 33,000*l.* in dividends. The lodes in Melindur Valley were very similar to those in Cwm Erfin. The south lode was from 5 to 6 ft. wide, and presented every indication of proving a great success. It was his firm belief that when the shaft had been sunk to anything like a reasonable depth the lode would be found of considerable value. Goginan was at a distance of a quarter of a mile south, while Cwm Erfin and East Darren adjoined the sett. Goginan was a good mine, 120 fms. deep, the course of ore at the bottom of the mine being 70 fms. long, and it was proposed to sink the shaft to a greater depth, whereas Melindur Valley was as yet only 14 fms. below surface. Speaking generally, he did not know a better sett.

Mr. ROSS supposed that Capt. Williams intended it to be inferred that, as the lode in Melindur Valley at 14 fms. only from surface was so exceptionally good, it was only reasonable that at a greater depth similar results would be realised to those obtained from the adjoining and surrounding mines.

Capt. WILLIAMS said it was his firm opinion that such would be the case, and that they would meet with good bunches of ore.

Mr. ROSS: Has another level been commenced yet, and if so how far is it driven in?——Capt. WILLIAMS said they might come under the ore ground seen in the level above in about eight months.

Mr. HARRIS asked what amount of stoping ground would then be opened out, judging from the character of the lode in the adit level?——Capt. WILLIAMS said that some 200 or 300 fathoms of stoping ground would be opened out, worth 1½ ton per fathom.

The CHAIRMAN, in reply to a question, stated that they hoped to commence vigorous operations at the commencement of the year, and before the meeting separated he begged to thank Capt. Kitto and Capt. Williams for the information they had afforded, as well as for the confident opinion they had expressed as to the future of the mine.

Mr. ROSS asked if Capt. Williams could add anything to the information already communicated with regard to the north lode?

Capt. WILLIAMS said the mine being situated west of Cwm Erfin, and south of East Darren and Goginan, there was about 20 fms. to drive to reach the north lode. No man living could say that a good lode would not be met with in less than 10 fms. driving.

A SHAREHOLDER enquired the average percentage of silver per ton of ore for the surrounding mines?——Capt. WILLIAMS said that Goginan ore averaged 30 ozs., and Cwm Erfin 28 ozs. The lode in the back of the adit in Melindur Valley was worth 1½ ton per fathom.

Mr. ROSS asked if it were reasonable to calculate that small parcels of ore would be returned during the next 12 months?——Captain WILLIAMS said that dressing ore would be obtained from sinking the shaft sufficient, it may be, to pay the cost of sinking. The ore was very "clean," and in prills, therefore it cost less to dress. In a mine of a such a character, and in such a position, it was impossible to say what might be met with. Plenty of good ore could now be seen standing in the levels and on the surface. Personally, he had invested capital in the mine before, and was willing to do so again.

A boulder of rich lead was submitted for examination which Capt. Williams had taken from one of the lodes.

Mr. BEDFORD said he had been connected with mining for many years, and was the vendor of this mine; and so satisfied was he as to the result if properly developed that he was perfectly willing to add 50 per cent. to the guarantee he had already given—in other words, instead of 8 he would guarantee 12 per cent. if the shareholders would add to their present subscriptions in the same proportion, so as to ensure the vigorous development of the mine. He could not give a more substantial guarantee as to the great value of the mine.

The CHAIRMAN said the amount guaranteed by the vendors would be deposited in cash in the names of trustees. The interest would be paid half-yearly.

It was decided that a monthly report should be forwarded to each shareholder, explaining the position and prospects of the mine.

A vote of thanks was passed to the Chairman and directors, which closed the proceedings.

EAST WHEAL SETON.—At the four-monthly meeting of shareholders (Mr. T. PRYOR in the chair) the accounts showed a debit balance of 1339*l.* A call of 4s. per share was made. The Chairman stated that all bills were charged to the end of October, and labour costs to Nov. 15. The most important part to be considered was the holeing of Cartwright's shaft, which when done the big engine might be stopped. At the last meeting 50*l.* worth of copper had been sold, but at this meeting the amount received for sales of copper was 650*l.*—Capt. Hancock, of West Tolgus, had inspected the mine for a shareholder and his report was read at the meeting. It was of a highly encouraging character, and stated he was surprised to see such a fine lode in the mine. He had no hesitation in saying it was the same as they had in West Tolgus, the most productive lodes of which were coming towards East Seton. The managers, Capt. W. Pascoe and H. Arthur, reported that Cartwright's shaft was sunk 9½ fathoms below the 48 fm. level, lode from 3 to 4 ft. wide, and improving in depth, now worth 4 tons of good ore per fathom. The 48 end east of shaft was driven 17 fathoms, lode 2 ft. wide, worth 2 tons of ore per fathom. The winze sinking below the 48 fathom level, 15 fathoms west of shaft, was down 6 fms., lode 5 ft. wide, and worth 5 tons of ore per fathom. This winze had, on an average, 5 tons of ore per fathom for all the sinking, and seeing that there was a lode in Cartwright's shaft that would produce 4 tons of ore per fathom, they were laying open a good piece of ore ground, which they considered to be a very important feature in the mine. The stope in the back of the 48, west of shaft, is worth 2 tons of ore per fathom. The managers inspected West Tolgus Mine about a month since, and found from careful examination of the lode, and country rock in which it was embedded, that it was in every way similar to the lode they were working on at East Wheal Seton, and it was believed that they were on the same lode as that of West Tolgus, where there were such fine courses of ore.

NORTH ROSEWARNE.—At the meeting, on Tuesday (Mr. John Watson in the chair), the accounts for the 16 weeks ending Nov. 1 showed a credit balance of 47*l.* 17s. 1d., and a balance of liabilities over assets of 339*l.* 17s. 9d. A call of 20s. per share was made. Capts. E. Hosking and John Sweet reported upon the various points of operation. They think the prospects of the mine better than they were at the beginning of the quarter.

WEST BASSET.—In anticipation of the quarterly meeting which will be held on the mine next week, the purser, Mr. Lightly, has forwarded to the shareholders the agent's report, signed by James Nicholas:—Grenville's shaft: Flat lode: Four points are valued here at 57*l.* per fm.; in addition at and about this shaft there are 14 stopes working, worth on an average 12*l.* per fm.—Percy's shaft: Four points are valued here 52*l.* per fm.; in addition there are 9 stopes working at and about this shaft, worth on an average 11*l.* per fm.—Thomas's shaft.—Middle Lode: Three points are valued here at 31*l.* per fm.; there are also at and about this shaft 18 pitches, working at an average tribute of 12s. in 1*l.*—Pascoe's shaft: At and about this shaft 16 pitches are working at an average tribute of 10s. in 1*l.* Total productive points worth 407*l.* per fm. No call will be made. Number of men employed underground on tutwork, 208; and on tribute, 66: total, 274.

[For remainder of Meetings see to-day's Journal.]

TECOMA SILVER MINING COMPANY.

The first report of the newly-appointed manager (Mr. R. St. Stephens) was issued on Wednesday.

Mr. St. Stephens states that in accordance with instructions he has the honour of submitting particulars of the working operations from the time the property came under their control until the date of his arrival.

At the Gladstone location, owing to the somewhat unfavourable character of the lode, and the extreme compactness of the limestone rock, very little work has been done, and all operations were suspended until a more convenient opportunity presented itself. At the Shanley location, at Discovery or Shanley shaft, sunk by the original proprietors to a depth of 70 ft., at an angle of 45°, and running down with the lode, in the back or hanging-wall, as also on footwall, are indications that a large body of ore had been taken out, the vein varying from 2 ft. in thickness to 6 ft., then breaking into "shoots" tending in a south easterly direction, with occasional pockets of rich carbonate ores. At a depth of 54 ft. a level—the north drift—was run in a northerly direction 161 ft., for 70 ft. following the course of the vein, which varied in width from 6 in. to 6 ft., increasing at a distance of 22 ft. from the shaft to 8 ft. in width, with good defined walls. At this point No. 1 winze was started, but after sinking 10 ft. the ore gave out, the vein matter changed into iron, and the lode bearing away west, parallel to the slope of the hill, further work was discontinued. On commencing No. 1 winze a string of ore was observed on the hanging-wall, which was traced by No. 2 winze to a depth of 6 ft., but the vein bending away under the north drift it was followed for 26 ft., when the ore again giving out this winze was abandoned. At 72 ft. from the Shanley shaft connection was made with the Maxwell shaft for air, and north of this connection No. 4 winze was sunk to 9 ft., but very little ore found. From this point to the end of the north drift, a distance of 74 ft., a few bunches of ore were discovered, but none of any value. At 10 ft. from above north drift (and in the shaft) stoping was commenced on a piece of ore ground, which ran up to the surface in the form of a "shoot" or "chimney," varying in its thickness from about 1 foot to 2 feet, coming out at the Maxwell shaft, 72 ft. above. The drift running south from the shaft, and in a line with the north drift, was run by the first owners for a distance of 34 feet, and within a short distance from the starting point it opened out into a chamber of ore 8 ft. deep, showing the ore as being continuous. At 34 ft. from shaft a rise was started to surface for air, a distance of 55 ft.; in this rise several bunches ore were found. From bottom of the air-shaft a drift was run in a south-westerly direction for 10 ft. on a thin ledge of ore, but as it gave out the driving was stopped; a cross-cut was also run in 10 ft. in a southerly course. At 30 ft. from shaft a cross-cut was driven easterly, and after 10 ft. had been run it opened into a bonanza, which, after removing the waste matter that had fallen from the roof, measured 25 ft. in length, 23 ft. in width, reaching to a height of 10 ft. On cutting through the ore, by means of cross-courses, it was found to vary from 1 in. to 4 ft. in thickness, but considerably mixed up with waste matter, the greater portion now lying on the dump. After further explorations the cave was opened into 54 feet from starting point, for the last 20 ft. it was 10 ft. wide, and dipping at an angle of 37°. Underlying the vein matter the rock was decomposed in places for a depth of 10 ft.; ultimately the walls closed in on all sides, leaving not a trace of ore to follow. On breaking into this cave, or bonanza, it was thought—the appearances exhibited being so favourable—that large quantities of very rich ores were exposed; these anticipations, however, proved most illusory on further development, as the total quantity of pay-ore sacked did not exceed 30 tons. In a southerly direction from the cave a drift was run 35 ft., following a small vein of galena ore, but the hard blue limestone rock being too expensive to drive the level was abandoned, especially as the adit level would prove this part of the ground, and save the no inconsiderable expense of hoisting.—The Orbit Location: The shaft 100 ft. west of the Maxwell has been sunk 25 ft., on a small vein of ore; the vein at the bottom of the shaft becoming pinched, and sinking too expensive, having in view the limited amount of funds at disposal, the men were removed to the Lumsden location; The Lumsden shaft, 84 ft. south-west of the Shanley, and on alignment with the mouth of the Stanford tunnel, was, at the time of his arrival, sunk to a depth of 88 feet. At 50 ft. from surface a landing was made, and two drifts were run, one north for 30 ft., through a body of iron ore, and the other south for 15 ft., also through iron ore. At the latter point about 6 tons of good ore were extracted. This important part of the mine will be further explored at a future date.

The Stanford Tunnel.—The initial point of the tunnel is situated outside the original Lumsden location, and in a claim recorded by McElroy and Co. It was manifest that the power to run the tunnel through this neighbouring claim would be of the greatest advantage to the company, not only on account of tapping the Lumsden and Shanley shafts at a considerable depth, but also for the disposing of the debris and tramming out the ore. With these objects in view, Capt. Gray, the agent at the mines, entered into an agreement with McElroy, by which the necessary permission was obtained. To the Shanley (113 ft.) bunches of iron and galena ore were met with, but nothing of importance until within 10 ft. of the connection, when a body of ore was struck which continued in a fine lode to the head (end) of the tunnel, varying from 3 in. to 3 ft. in width. In driving the tunnel about 25 tons of galena ore have been extracted, three separate assays of samples taken from different points give the following results: Sample No. 1, 37 per cent lead, and 847·00 silver; sample No. 2, 63 per cent. lead, and $47·13 silver: No. 3, 75 per cent. lead, and $73·82 silver. Within the past few days an almost vertical vein of good galena ore (splendid smelting ore) within well-defined walls has been discovered in close proximity to the Lumsden shaft, and upon this vein tunnel winze No. 1 is being sunk; they are now down 15 ft., the lode still running at the same favourable inclination. The whole of the mines being now accessible through this adit, all the waste matter is run out and thrown down the side of the mountain, and the sacked ore trammed to the platform erected outside the entrance. As to the McElroy and Co.'s location dispute, Mr. St. Stephens remarks that Capt. Gamble, acting on his orders, had traced out the lode from the tunnel to the surface through the Lumsden shaft: and on their success being established, he invited the inspection of the claimants so as to prevent any litigation, and demonstrated to them that their jumping, black-mailing work, was rendered completely nugatory. Donnelly acquiesced, and desired to be taken on at the works. McElroy proposes to contest his imaginary claim.

At no time since the mines have been in the possession of the present company have they presented such favourable appearances as at present for becoming a remunerative property, nor is there in the whole of the mountain as yet developed such a strong vein of ore as is now uncovered in the head of the tunnel, and worked on in the No. 2 winze (tunnel). To develope this part of the mine is now his earnest endeavour, and in the prosecution of this work he is most ably assisted by his agent, Capt. Gamble. In order to carry out these works a sum of not less than 2500*l.* to 3000*l.* would be required, and with this sum at his disposal more real work would be done in thoroughly developing the property than has been carried out since the operations of the company commenced.

All calculations as to the reserves of ores will be undertaken with considerable diffidence, the yield of lodes being so very defective—at one point giving tons per fathom, and ere a foot had been driven the lode lost, only to be found again as a small string of no value whatever, and then swelling out to a fine promising lode, carrying good paying ores—thus rendering any calculation as to reserves of no more value than mere surmise. This irregularity must necessarily continue until the works are prosecuted further into the mountain, and a greater depth be attained. He cannot, after matnre consultation with Capt. Gamble, conscientiously place the reserves of ore in sight at the mines above the Stanford tunnel at a higher figure than 100 tons of pay ore.

The water necessary for the mines has to be brought from about 2½ miles distant, and near to Buel, at a cost of $5 per day. A carrier is entirely employed on this service, and brings up to the mines, with a pair of horses, about 100 gallons per day. As soon as sufficient funds are at his disposal he will prospect for a water site, and he thinks that, by sinking a well at the foot of the immediate Tecoma Mountain, water can be reached at an outlay of about $400 to $500. Of wood there is sufficient for all mining purposes in the immediate vicinity, and can be obtained merely for the cost of cutting and hauling.

The indications throughout the entire works have been from time to time of the most reassuring character. The whole of the mountain is very highly mineralised, and in nearly every part of the mines vein matter has been discovered of more or less richness, and a considerable body of ore has already been extracted, though by no means of the quantity or quality that might have been fairly anticipated from the appearance of the lodes and of the surrounding strata at the time the company commenced their operations. In conclusion, he cannot do better than quote a remark of their trustworthy agent, Capt. Gamble:—"In all my 20 years' experience of mining on this coast I candidly confess I have never met with mines of so deceptive a character, yet I am fully convinced, from the manner the lodes are now going down and back into the hill and their regular run, that, if time be given to prove them, they will at no distant date become an excellent and remunerative property."

EXCHEQUER GOLD AND SILVER MINING COMPANY.

The subjoined letter has been addressed to Mr. Lewis Chalmers, manager of the company's mines, by Prof. Rossiter W. Raymond, the eminent geologist and United States Government Commissioner of Mining Statistics:—

SIR,—Yours of Oct. 30, with accompanying box of ores, duly received. The specimens are very interesting to me, and undoubtedly indicate true fissure vein formation, and rich ores. As you know, our experience with such ores (ruby, silver, &c.), in this country and in Europe, has been that the veins, though continous, fluctuate in value. Examples might be given from Reese River, Owyhee, Andreasberg, in the Hartz, &c. But a great deal of money has been made from such ores, and I must confess that the specimens you sent from the Exchequer agreeably surprised me in their character and richness. Possibly I might be requested to visit the district in the spring, as soon as it is accessible. I hope to visit it anyhow next year, in my official capacity, and would be glad to give you freely, in a friendly way, and for your private use only, whatever suggestions or opinions might be impressed upon me. I am under obligations to you for much courtesy and assistance, which I shall be glad to repay. The report you have received is for 1871 to 1872. It was rendered March, 1872, but contains the statistics of the previous year. In the report rendered last spring, containing the statistics of 1872, your valuable contribution is included. That report is now printing at Washington, and will be finished, I hope, by January. I trust you will be able to send me during the winter—possibly before February 1, a similar summary for 1873. R. W. RAYMOND.

New York, Nov. 13.

DIED.—On Tuesday, Mr. W. H. JAMES, C.E., whose name is well known to the readers of the *Mining Journal* as one of the earliest engineers connected with the development of our railway system. In his large edition of the "Life of George Stephenson" Mr. S. Smiles writes:—"W. H. James, son of the first surveyor of the Manchester and Liverpool Railway, patented a new form of boiler in 1825, the object of which was to increase the heating surface by means of a series of annular tubes placed side by side and bolted together so as to form by their union a long cylindrical boiler, in the centre of which, at one end, the fireplace was situated. A model of this boiler was shown both Mr. Losh and Mr. Stephenson about 1827. Mr. Losh expressed his opinion that if such a boiler could be put to Mr. Stephenson's engine there would be no limits to its power." Mr. James spoke of a speed of 20 or 30 miles an hour, at which Mr. Stephenson shook his head, remembering, as no doubt he did, his severe cross examination and denunciation by counsel before the House of Commons for venturing to say 12 miles an hour might be achieved by the locomotive on railways, and he said that was a rate of speed they "did not now dare to talk about." Mr. James, who was a man of the kindest and mildest disposition, spent the greater part of his life in inventing. For some time he has been a great sufferer, and at last sunk under an attack of bronchitis and asthma.

—On Sunday, Dec. 14, aged 74, Mr. JAMES MATHER, of South Shields, respected by all who knew him. Mr. Mather was well known to the readers of the *Mining Journal* from the energy he displayed in connection with the establishment of our present system of official mine inspection. The terrible explosion in St. Hilda's Pit, South Shields, by which, on June 18, 1839, 52 lives were lost, drew Mr. Mather's attention to the perils of a miner's life. As soon as he heard of the accident Mr. Mather hurried down the shaft and sought to relieve those in peril below. This incident caused him to urge the formation of a committee to enquire into the causes of accidents in mines, of which committee, on its appointment, he became honorary secretary. For three years the committee laboured at their great work, and in 1842 a complete and exhaustive report of the labours of the committee was drawn up by Mr. Mather, who justly earned a European reputation for the ableness of the report. The value and importance of this document may be judged when it is stated that in 1852, it being out of print, the report was specially re-printed by order of the Government. On the recurrence of the explosion, by which upwards of 70 lives were lost at Burradon Colliery, in 1860, Mr. Mather was again actively at work. He made a careful examination of the mine after the accident; and the evidence he gave at the inquest was of a most complete and exhaustive character. During that long-pending enquiry he was daily in attendance, and the assistance which he rendered did much to elucidate the circumstances and causes of the catastrophe. In 1851 Mr. Mather, along with Mr. Goldsworthy—afterwards Sir Goldsworthy—Gurney, the discoverer of the Bude and Drummond lights, and the inventor of the steam jets ventilation, proceeded to Scotland for the purpose of endeavouring to extinguish a fire which had been burning in the mines of the Earl of Mansfield for 25 years. After considerable labour, and encountering innumerable dangers and difficulties, Mr. Mather and his fellow-labourer had the satisfaction of witnessing the complete success of their work. The vast and destructive fire was entirely extinguished by means of forcing carbonic acid and nitrogen gases into the waste where the coal was burning. While busy with these labours in Scotland, Mr. Mather was summoned to Newcastle to receive from the Coal Miners' Society of Northumberland and Durham a handsome silver cup as a mark of their "gratitude for his talented and praiseworthy exertions in promoting measures to diminish the dangers from bad ventilation and other causes in the mines of this kingdom. After the successful extinguishment of the fire in the Earl of Mansfield's pits Mr. Mather and Mr. Gurney were sent for to go to Bolton to put out a fire in one of Lord Bradford's mines, and here, while leading a gang of men into the mine, when the fire was expected to have succumbed to the gases forced into the workings, Mr. Mather was suddenly seized with the white damp, and fell down insensible, in which condition he was dragged out of the mine. Fresh air, however, restored him. The Government Inspector of Mines, who was present at the Bolton fire, speaking of Mr. Mather's success on the occasion, said—"The advantages which Mr. Mather and Mr. Gurney have conferred on coal mining are invaluable; and, as for the judgment and energy of Mr. Mather in the colliery yesterday, I could not have believed it unless I had been present. He is a man in a million." His name will long be remembered and honoured, and the mining community generally will deeply regret his losss.

CHEMICALS AND MINERALS.—Messrs. R. R. Kelly and Co. (Manchester, Dec. 19).—The Chemical Market has in no sense improved, nor is it expected to improve until the New Year. There has been the uniform consumptive demand, and no more. Enquiry is rife as to the probable value of the leading products for next year; but, as no satisfactory information is forthcoming, the would-be purchasers cautiously retire. Values remain pretty much the same; quotations in many cases nominal. Undue pressure is put upon the fact of some 20,000*l.* reduction in value of exported Alkali in November, as compared with November, 1872, omitting to notice that last month contained one working day less than the preceding November; and ignoring altogether the more important fact that nearly 20 per cent. increase is observable when the Alkali exports of this year are compared with the corresponding period of last year.—MINERALS: China-clay, 42s. to 45s.; phosphate of lime, ordinary, 60 per cent., 1s.: 60 per cent., 1s. 4d. to 1s. 5d. per unit; Bolivian, 6*l.* 15s.; Canadian, 80 per cent., 1s. 4d. per unit: Estramadura, 1s. 3d. to 1s. 5d.; Curaeoa guano, 6*l.* 2s. 6d. U. K., and 6*l.* 5s. to 7*l.* continent, 70 per cent.; chrome ore, 6*l.* to 8*l.*; copper ores, 16s. to 16s. 6d. the unit; iron ores, red hematites, British, 25s. to 35s.; Spanish, none; clay ironstone, 15s. to 26s.; oolitic, 9s. to 12s.; burnt iron ores, 60 per cent. the unit; Manganese ores, 70 per cent., 140s. to 150s.; pyrites, cupreous, 8½d.; non-cupreous, 10d. the unit.; antimony ore, 12*l.* to 16*l.*; antimony regulus, 56*l.* to 57*l.*; Chili copper regulus, 16s. 6d. to 17s. the unit.

FOREIGN MINING AND METALLURGY.

Transactions in copper have been very quiet at Paris, the offers made by holders indicating some feebleness. Chilian in bars has made 88*l.*; ditto in ingots, 93*l.* 16s.; tough English, 94*l.*; and Corocoro minerals 91*l.* per ton. Chilian copper has been dull and quiet at Havre. There has been no great amount of business passing upon the Marseilles market, but business has been pretty well maintained. The state of the German copper markets has not experienced any material change; purchasers have only bought to meet the most pressing requirements of consumption, and speculators have held aloof. Advices from Holland state that while at the recent public sale the average price realised for Banca was 67·45 fls., some sales subsequently caused prices to decline to 66 fls. Since then purchases on English account have again carried Banca to 70 fls. It should be remarked that holders of Billiton have remained passive spectators of these fluctuations. At Paris tin has still remained comparatively feeble; Banca has made 123*l.*, Straits 124*l.*, and English 123*l.* per ton. At Marseilles tin has been rather feeble. The German tin markets have been quiet, with a limited demand. The Paris lead market has maintained a good tone. French lead, delivered at Paris, has brought 24*l.*; Spanish, delivered at Havre, 23*l.* 16s.; English ditto, 24*l.* 8s.; and Belgian and German, delivered at Paris, 24*l.* 4s. per ton. At Marseilles the article has been rather feeble. Zinc has been dull at Paris, and prices have fallen. Silesian, delivered at Havre, has brought 27*l.* 8s. per ton. At Marseilles, Vieille Montagne zinc, in sheets, has been quoted at 34*l.* 16s. per ton.

The agents and speculators who have helped to make coal so dear in France have become rather panic-stricken of late, and this circumstance is thought to have precipitated a fall in prices, which might not, perhaps, have otherwise been witnessed before the commencement of 1874. Some colliery proprietors appear disposed to oppose a movement which, after all, they cannot stop. Stocks of coal, although increasing in France, are still not very heavy, because many collieries have still some old contracts to work out, and their owners are applying themselves rigorously to the execution of their engagements. But although stocks may not be very large at the pits' mouths, they are considerable in the yards of merchants and elsewhere, and they are not likely to materially diminish, notwithstanding some reductions of price which have been consented to, and notwithstanding the appearance of frost. The Paris coal market still exhibits downward tendencies, and similar tendencies have become more decided in the basins of the Nord and the Pas-de-Calais. The imports of coal into France in the first nine months of this year presented an increase of 150,000 tons as compared with the corresponding period of 1872. Belgium sent France 180,000 tons less in the first nine months of 1872, but England forwarded 180,000 tons more, and Germany 160,000 tons more. The exports of coal from France increased about 100,000 tons in the first nine months of this year, as compared with the corresponding period of 1872.

The French iron trade has experienced scarcely any change. The managers of the principal works are hoping to be able to continue their operations until the customary revival in business in the spring. The general movement of pig and iron in France during the first ten months of the current year differs only slightly from the corresponding movement for the corresponding period in 1872. The imports of iron minerals into France during the first ten months of 1873 amounted to 657,956 tons, of which 99,590 tons came *via* the Belgian frontier, 163,519 tons from Spain, 232,805 tons from Algeria, and 111,686 tons from Italy. The imports of iron, rails, and plates into France in the first ten months of this year amounted to 40,574 tons; the exports of iron, rails, and plates from France in the same period amounted to 241,424 tons. In the Nord the price of iron is sustained at 10*l.* 16s. per ton. The pig of the Meurthe and the Moselle has been dealt in at 4*l.* per ton. Puddled construction plates have been dealt in at St. Dizier at 16*l.* to 16*l.* 8s. per ton.

The appearance of frost has not at present changed the tone of the Belgian coal trade, and prices instead of hardening have even exhibited fresh reductions. The colliery proprietors who formerly sustained prices with so much unity are now divided into two camps. Those who have still contracts to work out advocate the continued maintenance of quotations at their present level, but the ranks of this class are rapidly thinning. The second body is composed of those who, not having an outlet assured for their production, now desire to fill their order-books, even although they may have to make some sacrifices to do so. This last party appears the most prudent, as present quotations are still very remunerative, and it would be well to assure upon such conditions the production of collieries for the whole of 1874. The double tendency in affairs to which we have been directing attention has been abundantly illustrated in the transactions of the last few days. There can scarcely be said to be any longer quotations for coke; transactions have been concluded at almost any price which can be obtained; the terms realised are always low, as metallurgy does not revive, but requires a strong impetus in order to regain its ordinary course. In the Liége district there is less resistance to a reduction than at Charleroi, and almost all the local coalowners are beginning to consent to comparatively easy conditions. The imports of coal into Belgium, which stood at 139,000 tons in the first nine months of 1872, rose in the corresponding period of 1873 to 465,000 tons, of which 120,000 tons came from England. The import movement is still far from diminishing, 61,000 tons having been imported in September alone, while the corresponding imports in September, 1872, were only 13,000 tons. The exports of coal from Belgium in September, 1873, amounted to 378,000 tons, against 440,000 tons in September, 1872; for the whole of the first nine months of this year the exports, as compared with the corresponding period of 1872, present a diminution of about 300,000 tons. The exports of coke from Belgium present some progress, having amounted in the first nine months of this year to 650,000 tons, against 575,000 tons in the corresponding period of 1872. The coke exports of September amounted, however, to only 64,000 tons, as compared with 65,000 tons in September, 1872. The Crachet and Picquery Collieries Company will pay (Jan. 2) a first dividend for 1873 at the rate of 5 per cent. per annum, or 1*l.* per share.

The production of iron in Belgium is considered to be diminishing rather than otherwise. The Providence Forges Company has decided on extinguishing a fresh blast-furnace, and if the general state of affairs does not experience a change it appears certain that other establishments will have to pursue a similar course. A considerable fall in industrial coal can alone bring back activity to the various works, but we must not expect too soon a revival in affairs equal to that which followed immediately upon the close of last year. In this exciting period of depression it may be well to recal the fact that the rapid development of metallurgical industry in Belgium during the last few years has been altogether unprecedented. In the Charleroi basin, for instance, the production of pig in 1842 was 40,000 tons, while in 1852 it was 81,821 tons; in 1862, 199,790 tons; and in 1872, 400,000 tons. In other words, the increase in the production was 218 per cent. in the first decade, 499 per cent. in the second decade, and 1000 per cent. in the third decade. The production of iron in the Charleroi district in the same period has increased at even a more rapid rate. In the first decade the growth of the production was 177 per cent., in the second decade 534 per cent., and in the third decade 1190 per cent. Thus, in 30 years the Belgian production, as well of pig as of iron, has nearly decupled, while at the same time the consuming markets appear to have for the moment a tendency to decline in importance rather than otherwise. What Belgium must do in order to regain her position abroad is to produce good iron at a cheap rate—a condition of things which it is probably very difficult to realise, if we take into consideration all the unfavourable circumstances of the moment. The exports of rails from Belgium in September presented a decrease of about two-thirds, as compared with the corresponding month of 1872; in plates there was a falling off of one-half. The general diminution in the exports of manufactured iron from Belgium in September, as compared with September, 1872, was rather more than 50 per cent., the aggregate deliveries having been 141,218 tons in September, 1873, against 28,686 tons in September, 1872. The Ougree Collieries and Blast Furnaces Company will pay, Jan. 2, a dividend for 1872-3, at the rate of 3*l.* per share.

COAL IN KENTUCKY.

In an interesting paper recently read before the Polytechnic Branch of the American Institute Prof. R. P. STEVENS remarked that Kentucky is the only State mineralogically endowed with two distinct coal fields. The coal of Illinois enters the State near Hawesville, and occupies nearly the whole of 12 counties in the north-western portion of the State. The Appalachian coal crosses the Ohio River a little above Portsmouth, and fills up nearly the whole of the eastern 20 counties. Between these coal fields lie rich mines of iron ore, lead, zinc, and petroleum. The interior of the State is blessed with some of the most fruitful fields of the United States. An agricultural and grazing country, capable of sustaining any manufacturing and mining population of the mineral portion. Referring to the survey of the portion of the eastern coal field left unfinished by the late Prof. D. D. Owen, he says that approaching the south-eastern counties by the Cumberland Gap branch of the Louisville and Nashville Railroad in Rock Castle County we first encounter the sub-carboniferous limestone, which is the floor of the coal measures of the State. The limestone series are here 350 ft. thick, composed of an underlying sandstone, some few feet of coloured shales, white marble beds, cherty beds, and encrinal limestone. Upon this member of the group reposes the coal conglomerate, frequently 80 and 90 ft. thick. Ten miles from Mount Vernon, the county seat of Rock Castle County, at a station of the railroad named Pine Hill, coal workings were first met. The coal measures of the three hills where the coal is opened rests immediately upon the limestone without the intervention of the conglomerate; it being in this case quite an anomaly. There are two veins of coal in the hills. The lower one, at an elevation of 50 ft. above the railroad, is too impure to be of any commercial value. The upper coal, about 50 ft. beneath the summit of the hills, is the one worked by the collieries; the depôt is half a mile northward. Three different collieries are worked, shipping some 20 to 25 carloads a-day. The upper coal is 3 ft. thick, and has the usual appearance of a good dry-burning bituminous coal. It was thought by some ironmasters from Mahoning, Ohio, to be worthy of trial for manufacturing of iron in its raw state.

Four miles further eastward from Pine Hill the lower coal is worked for local purposes at Mains Bank. The vein is 3 ft. thick, with a parting of clay in the middle. It is a good, free-burning coal, and much praised as a grate coal. Half a mile north from Mains Bank, and on the north side of Rough Rock Creek, the upper coal is worked and daily shipments made. Between these two last-mentioned coals and Pine Hill lie hills of conglomerate and sandstone, which must, in the days of these coal formations, have been ridges of sand and gravel hills between them. At Livingston Station, the terminus of the road, the upper coal is again worked, and a fair business done by the two companies working the mines. Crossing Big Rock Castle River the limestone of Mr. Vernon is seen at the base of the hills extending up some 100 ft. Ascending Wild Cat Mountain to the height of 700 it. above the river, and passing over seven miles of country filled up with sandy shales and thick-bedded sandstones no signs of coal are seen. The flat summit of this mountain is a pinkish sandstone, easily weathering to a fine sea sand, and standing in many places as high walls, castellated walls upon the crest of the mountain.

Descending into the valley of Hazel Patch, and down it into the valley of Little Rock Castle River, we soon begin to ascend to an extensive table land, reaching southward and eastward through Laurel and Knox Counties. Before reaching London, the county town of Laurel County, there is a vein of coal under sandstone. At London, in the fields and village lots, there is a 2 ft. vein of coal, which supplies the town with fuel. It is mined in the low land by simply stripping off a few feet of alluvial clays. There are 2 ft. of good free-burning coal. Travelling eastward, from London to Manchester, the county seat of Clay County, 25 miles over a country constantly rising by a series of broken plateaus, composed of thin-bedded sandstones and shales, though sometimes, especially on the east side of the hills, the sandy layers harden up and become massive. No valuable coals were seen.

In the tributaries of Kentucky River five different coals were met with. At Goose Creek, in Clay County, there are salines and several salt boiling works in active operation, owned and worked by Col. Garrod. Enough salt is made at these works to supply the contiguous country, and eastward into the mountains of Virginia. The main coal of Goose Creek is used for fuel. Ascending Little Goose Creek we enter upon a new series of coals—seven in all—before reaching the boundary of Harlan County. The distance travelled is 25 miles. Crossing the divide into Stinking Creek, flowing south-east, we descend it 15 miles, noticing as we descend great trunks and branches of the ancient carboniferous forests, now petrified trees, too large to pack on our mules for cabinet specimens. On the way down several veins of coal were noticed which might be the same as were passed ascending Little Goose Creek.

After 15 miles of travel the writer turned sharply into the valley of Straight Creek. Up to this point for the 75 miles travelled over the rocks and coal were seen gently dipping eastward rarely exceeding 2½°, when suddenly the explorer is confronted with a wall-like mountain, effectually stopping his progress, and over which there is no pass for more than 50 miles, stretching away north-east and south-west. The limestones at the base of the coal measures on the railroad and at Rock Castle River are elevated 1000 ft. and more. The strata now have a steeper dip south-eastward from 25° to 30°. This is the upthrow of Pine Mount. It is but 2½ miles wide. Structurally considered, it is a small fragment of the coal and sub-coal measures, 2½ miles wide, by 50 miles long, broken off by a clean-cut fracture from the western coal measures, and thrown up into the air 2000 ft. above its normal level. It rises abruptly from the Cumberland River, at the Cumberland Ford, and is continued northward as far as the limits of Harlan County, where it is merged in the larger uplift of the Cumberland mountains. When it was thrown up, it doubtless carried with it the 3000 ft. of the coal measures, and this enormous mass has been degraded by the waters of Stinking Creek on the west, and Poor Fork on the east, for no coal is found on its summit.

For a whole day Prof. Stevens rode at the foot of this mount, which towered on his right hand, a mass of unbroken forests clothed in the colours of autumn's foliage, and he remarks that he never encounters in his geological rambles these surprising exhibitions of elevating forces without being overwhelmed in contemplation of the mighty power that was able to fracture the solid earth, and lift broken fragments thousands of feet into the air, not violently, but so gently as not to break the most delicate fossil entombed in the mass. The coals over which he travelled, 15 in all, now lie hidden and useless in the hills and forests of Kentucky, but he predicts that the day is not remote when the iron interests of the State will demand railroads to be built to them, and then, like the hills of Reading and Lehigh, the hills of Kentucky shall be lighted with the fires of bloomeries and furnaces, and the sound of the forge re-echo through the valleys.

AGASSIZ.—By the death of Prof. Agassiz the world of science in America has lost one of its brightest ornaments. Since his acceptance, in 1846, of the professorship of zoology and geology in the great scientific school at Cambridge, U.S. (he was then in his fortieth year), he has been essentially American, his first home in the beautiful Canton de Vaud, Switzerland, being thenceforward banished from his memory, for the benefit of his adopted country. With regard to the movement of glaciers, his theory was decidedly a bold one. There was the known fact that glaciers had retired from certain places. Agassiz carefully looked for the traces of their former presence, or of their motion in the parallel roads at the bases of great elevations, and in the scratched or polished surface of the rocks. It was this glacial movement, he contended, that accounted for what may be called Nature's Stonehenge—the appearance of immense isolated blocks of mountain in districts where the soil is of a totally different character. Many geologists were disposed to accept his hypothesis, though some held that in working out his speculations Agassiz had attempted to do too much with an over pliant theory; in the result, however, it aided materially to earn him a high reputation. Since his settlement in the United States he has largely helped, by his name and exertions, to confer distinction on the science of the country. He had not been long at Cambridge before he began to collect the zoological treasures of his new country. His object seemed to be to make up by energy and dispatch for the neglect of years, and to put the United States on a par with Europe in regard to collections of this nature. For this purpose he organised a system of collection by deputy, which, in its vastness and in the extent of its application, might almost be called a sub-department of Government. While he was at work in one place, his correspondents were busy for him in another. He himself successively visited the Atlantic and the Gulf Coasts, the valley of the Mississippi, and the base of the Rocky Mountains, his agents being all the while at work along the Pacific Coast. The result was that in a few years he possessed a collection of plants and fossils in some respects more rich than anything of the kind in Europe. Scientific men of the United States gave him their time, rich men aided with their money, and eventually the Museum of Comparative Zoology was founded and endowed for the reception and preservation of his and the nation's treasures. His works on physiology and kindred subjects are numerous, and in the discussion of almost innumerable scientific questions he afforded a vast amount of useful information. May his memory stimulate the rising generation of science students in America to equal energy and devotedness.

FOREIGN MINES.

SWEETLAND CREEK (Gold).—On Tuesday the directors declared a quarterly dividend of 5s. per share, free of income tax, payable on and after Dec. 25.

SIERRA BUTTES (Gold).—Result for November: Sierra Buttes Mine: Receipts, $21,000; cost of mining and milling, $12,000. The supply of water is now getting plentiful.—Plumas Eureka Mine: Receipts, $37,073; cost of mining and milling, $14,262. [An interim dividend of 2s. per share, payable on Jan. 10, upon both original and 1872 shares was declared.]

CAPE COPPER.—Captain Tonkin, Oct. 31: Returns for October: Yield from Ookiep, 675 tons of 30 per cent.; Spectakel, 67 tons of 29 per cent.—Railway: Traffic for six weeks ending Nov. 1, 780 tons up and 1750 tons down.—Bills of Lading Received: 430 tons of ore per Juliet Daniel, and 520 tons per Croydon.—Arrival at Swansea: The Glenudal, with 720 tons of ore.—Sales: On Nov. 18, by public ticketing, 282 tons of ore, and 18 tons of regulus at an average of 16s. 5¾d. per unit, realising approximately 7675*l.*; and on Dec. 2, by public ticketing, 487 tons of ore, at an average of 16s. 5¼d. per unit, realising approximately 13,275*l.* Put forward for sale, by public ticketing, on Dec. 16, 508 tons of ore and 10 tons of regulus. [Dividend declared, 20s. per share, free of income-tax, payable on Dec. 24.]

ST. JOHN DEL REY MINING COMPANY (Limited).—Advices received Dec. 1 ex steamer Tiber, at 3 P.M.:—

Morro Velho, Oct. 29.—VERTICAL SHAFTS: The work of the sumps of these shafts has been carried on steadily and constantly, the sinking at B being prosecuted continuously, and in which a fair amount of sinking is being effected. The precise amount will only be known after the measurement to be made at the end of the month.

At the A shaft the opening into the lode has very greatly retarded the sinking, the mineral quarried from the lode falling naturally into the lowest part, the SUMP. An arrangement has now been made, and a very strong doorway has been provided, to cover and protect the sump part of the shaft from the falling in of the mineral quarried from the adjacent lode. By this plan we shall endeavour to continue the sinking on a moderate scale in the A shaft, at the same time extending on across the lode to make space for boring and quarrying the mineral.

THE HERRING STAMPING MILL.—At present we are raising an average of (say) 34 kibbles of 1 ton 4 cwts.=41 tons each 24 hours. Next week we shall be able to increase this quantity. The work is going on steadily and satisfactorily.

Morro Velho, Nov. 1.—SINKING IN SHAFTS—OCTOBER:—

	Fms.	Ft.	In.	Total Depth.		
A shaft	2	1	3	184	2	7
B shaft	6	0	10	191	3	8
Total	8	2	1			

We are at the same time opening out into the lode from shaft A, and propose commencing to reduce the ore therefrom in the stamps on Nov. 3.

Advices received Dec. 15, ex steamer Douro, *viâ* Southampton:—

Morro Velho, Nov. 17.—GENERAL OPERATIONS: Since last advices the general work has been carried on steadily both in the shafts at surface and in the reduction of the mineral since it has been commenced. The supply of the latter is, of course, limited, owing to the small space yet available for quarrying in, but each week this space will be increasing, and so in proportion the quantity of mineral to be raised from the lode.

PRODUCE FOR OCTOBER.—The gold extracted in the month of October at MORRO VELHO from the—

Arrastres and Praia	381·9 oits.			
Loss in melting	6·0 ,,			
375·9 oits., at 8s. per oit.		£ 150	7	3
The cost, less sums receivable from the road contracts, is—Rs. 9148 $309, at exchange 26¼d. per milrei		1000	11	11
Showing a loss for October		£ 850	4	8

FERNAM PAES ESTATE.

The produce of October at the Gaia stamps amounts to—First division	190·2 oits., from 85 tons=2·237 per ton.			
Second ditto	449·5 ,, 202 ,, =2·225 ,,			
Total produce	639·7 oits.			
Loss in melting	4·0 ,,			
635·7 oits. at 8s. 6d. per oit.		£270	3	6
The cost being Rs. 2077 $579, at exchange 26¼d.		227	4	9
Shows a profit for October		£ 42	18	9
The outlay in October on vertical shafts account was—				
Sinking, timbering, &c., Rs. 15,371 $002, at 26¼d.		£1681	4	0
Surface work and new launders, Rs. 3557 $918, at 26¼d.		389	3	0
Total outlay		£2070	7	0

The outlay at vertical shafts both of timber and skilled labour is about 200*l.* heavier than that in September, and has arisen chiefly from the heavy timber work which became necessary to arrange for entering the lode for hauling arrangements, and for the protection of those working on the sump and adjacent excavation.

GOLD EXTRACTED TO DATE.—The produce obtained during the first 11 days of November amounts in all to 1180 oits., and has been derived as follows:—

The mineral from lode through the shaft A amounts to	980·8 oits. from 231 tons=4·245 per ton.	
From Arrastres and Praia	74·1 oits.	
	1054·9	
From Gaia stamps	125·1 oits. from 42 tons=2·978 per ton.	
Total	1180·0	

On the evening of Nov. 3 the reduction of the mineral from the lode was commenced at the western side of the Powles stamps, being 18 heads, and on the 8th one side of the Herring mill was also put to reduce this mineral. From the quantity reduced the produce is a little under what might have been expected. It should be borne in mind that there is a certain proportion of killas in this mineral—that being raised in part of the south side of the A shaft, the sump of which is not yet entirely within the lode, and that taken down between the higher parts of the excavation and the shaft having gone up in enlarging the space in this way after entering the lode.

At the present time we have 42 heads employed in reducing this mineral. The last division of the month may probably give nearly the average produce formerly obtained from this section of the West Cachoeira Mine.

SINKING OF SHAFTS TO DATE.—This morning (Nov. 17) the sinking effected in the shafts since the first of the month was measured, and gave the following results, viz.:—

	Fms.	ft.	in.	Total depth.		
A shaft	0	5	2	185	1	9
B shaft	2	2	6	194	0	2
Sinking 16 days	3	1	8			

As already explained in previous letters, the driving and quarrying away the lode adjacent to the sump of A shaft has necessarily impeded the work of sinking there, and the time occupied in placing the large doorway, &c., over the sump has also delayed the working therein. At present the work is being prosecuted more uninterruptedly, and better sinking will be effected between this time and the end of the month.

The quantity of mineral quarried and raised to the surface from the shaft A since the beginning of the month has amounted to 329 kibbles of about 24 cwts. each.

The first 10 days gave an average of 30·8 kibbles daily, the last five days show an average of 44·2. A gradually increasing quantity may be expected to be raised until we reach the limit of our present hauling medium (the kibble) from shaft A.

RICHMOND CONSOLIDATED.—Cablegram, Eureka, Nevada:—"Hall, London.—Week's run, $45,000; two furnaces. Stormy. November profits, $77,000.—M'GEE."

PORT PHILLIP AND COLONIAL (Gold).—Telegram, Melbourne, Dec. 11:—"Month ending Dec. 3, yield per ton 5 dwts. 4 grs."

DON PEDRO (Gold).—Report for October: Produce—7872 oits. (=907 ozs. troy), at 8s. 6d. per oit. = 3345*l.* 12s.; Cost—Rs. 28,653 $379, at 26½d. per milreis = 3119*l.* 0s. 10d; Profit—226*l.* 11s. 2d.—First Division of November: Produce—weighed to Nov. 17—1295 oits. The ore obtained has again been taken from the canoa and Nos. 6 and 8 shoots and No. 4 gulley; quality, except that from the last-named, which is of less value, is about the same as that extracted last month. During the last two weeks we have fixed the iron rods in place of the chain substituted for wire rope connected to Dawson's wheel, and executed some repairs to pitwork, &c., and every effort is being made to get about the additional rods required to erect in place of the rope so as to resume sinking operations as early as possible. The water being drawn from the mine amounts to 16 cubic feet a minute.

ROSSA GRANDE (Gold.)—Oct.: The cost for the month, inclusive of 63*l.* 14s. 9d. expended on account of surface tramways, and 24*l.* 4s. 1d. towards the completion of Bahu stamps, amounts to Rs. 11,675 $839 at ex. 26½d.=1277*l.* 0s. 11d. The total daily average of force has been 229.—Produce: The produce for the month amounts to 1772 oitavas of gold, derived as follows:—Bahu, 1454 oits. from 258 tons of ore=5·63 oits. per ton. Cachoeira, 318 oits. from 70 tons of ore=4·54 oits. per ton: Total, 1772 oits. from 328 tons of ore=5·40 oits. per ton. I am sorry that the produce for October is low: this, however, is not owing to a want of mineral, but is due entirely to an insufficient supply of surface water to drive the stamping mills. Had we the usual quantity of rainfall at this time of the year about three times the above quantity of ore would have been treated during the month. Expecting at the beginning of the month, and almost every day since, that we should get an abundant supply of water, which we have usually two months earlier than this, I have sent a great quantity of mixed mineral to stamps that we were obliged to remove in order to lay the Bahu surface tramways, which will account for the yield per ton being below the average. The sinking in the sump is the greatest accomplished for the last twelve months, and the backs laid open amount to 45 fathoms 5 feet, whilst the extent of ground stoped is 14 fathoms 1 foot only. Owing to the lack of surface water to drive the Cachoeira pumping wheel faster, we are not yet in fork to the 20 fathom level, and, consequently, the most important point in this mine is in abeyance. The cost is high, but the work accomplished has been very heavy, and with the usual quantity of surface water, at this time of the year, instead of showing a loss, we should have presented a good profit.—First Division of November: Since the 13th inst. we have had a good supply of water, increasing our stamping power from 20 to 42 heads, and the quantity of mineral

from 12 to 30 tons a-day, so that, notwithstanding 13 days of the month have passed, during which time we had very little water indeed, if the present increase continues to the end of the month, the produce for November will, I estimate, be about 4000 oitaves of gold. The mechanics have completed the feeders of the Bahu stamps, and finished the Bahu surface tramways; we shall now lay out a good spalling-floor, and in the course of a few days commence making a cage to be worked by a belt from the axle of the pumping wheel, as a temporary means for hauling stuff from the Bahu Mine.—Bahu: Although the lode in the sump-shaft is not quite equal in size to that we had for about 20 fms. above the present bottom, it appears to be opening out east and west of shaft quite 5 ft. wide, and I have every reason to believe from this that the lode in the next levels will prove quite equal, if not superior, to any yet discovered at a shallower horizon. We are making good progress in sinking, and the strata are of a very congenial nature for the continuation and improvement of the lode in depth. Good quality mineral is being sent to stamps from the stopes in back of 28 east, and also from back and bottom of 18 west, the lode at all other points in the mine is about the same as when last reported on. Having now a good supply of surface water, we are draining the mine very rapidly, and operations in the 20 east will soon be resumed.—Third Formation: I have arranged a small force to sink on this lode, and after about 100 tons of stone shall have been quarried, I purpose sending some to stamps, in order to ascertain its value. The locality from which this mineral will be obtained is 50 fathoms to the east of the point the last parcel was extracted from this lode, and judging from samples lately taken and assayed it should leave a profit on working.

COLORADO TERRIBLE LODE.—Agent's advices, dated Nov. 24, to hand: Ore delivered during the week to Stewart's Works 12 tons. Mine looking very well in all the workings. The 37th shipment, valued at 1000*l.*, has arrived in Liverpool, per Abyssinia. The 38th shipment is advised by the agent as to be despatched before the end of November.

JAVALI.—Capt. Sohns, Nov. 5: One of the pulleys broke early in the month, thus causing the stoppage of five stamps, so only 15 has been at work, crushing 988 tons of quartz, and yielding 304¾ ozs. of gold, an averege of 6 dwts. 7 grs. per ton, which is valued at 730*l.* The expenditure was 713*l.* 9s. 8½d. (168*l.* of which has to be charged to capital account), thus leaving a profit on the month of 16*l.* 10s. 3½d. Health is good, and labour sufficient.

CHONTALES CONSOLIDATED.—The directors have advices from Mr. Smeddle, dated Nov. 5: Ore crushed during October, 1927 tons; produce, 395 ozs. of gold, average 4 dwts. per ton—value, 1107*l.*; cost for the month, 691*l.*, leaving a profit of 416*l.* The above cost includes 62*l.* charged to construction account. Mr. Smeddle reports: San Sebastian Mine: During the past month we have driven 21 feet in the No. 1 level, on the coarse of the lode, which is upwards of 8 ft. wide, but very poor; we have evidently passed through the rich shoot we had further back, the last 50 feet driven has been through very poor ground. I have considered this very strange, as we are now fairly under the old native workings, but during the last fortnight the lode in No. 4 rise has overlayed so much to the north, as well as become very poor, that I concluded we were not on the same lode as that worked by the natives: the rise is now at surface, and this supposition proves to be correct, the lode we are on has had very little work done on it at the surface, where it is poor. I have had the thick scrub cleared away, and there has been only a few shallow holes along the course. I have now commenced a cross-cut from No. 4 rise to intersect the other lode, and have no doubt we shall strike payable ground. In the No. 2 level east the lode is 5 feet wide, and worth about 5 dwts. per ton, in the west end of the same level it is about 4 ft. 6 in. wide, and worth about 3 dwts. per ton.—St. Domingo: During the past month we have had a considerable quantity of rain, which caused a rise over No. 1 level to close, and as we were obtaining the best ore from this part of the mine it has materially interfered with our returns: we have now completed a new one, and expect to have no further trouble.—San Felippe: This lode continues very poor, but I think it will improve. The cost per ton of ore delivered at the mill is 55 cents.—San Benito East: The new cross-cut is now in 140 feet, and from a change in the country I expect to intersect the lode in a few days.—Tramways: On account of the continued wet weather the contractor has made little progress; should this be a moderately fine month I expect he will complete the work.—Machinery: The spur-wheel for driving gear from water-wheel is at Nispiral, but it is doubtful whether the contractor will get it to the mines this month, the roads are so very bad.

SAN PEDRO.—R. M. Kitto, Oct. 31: New Shaft: The water has not forked more than 6 in. since my last, so it is impossible to get to the 150 fm. level before the machinery is in order. I have suspended all operations in the mine with the exception of a winze sinking below the 135. The north part of manto is now down 17 metres; the ground is favourable for sinking. The north level, driving south of the last-named winze at the middle level, or 15 metres below the 135, is producing very rich stones of ore, but I think we are not deep enough for the mass of ore that we expect to cut. This is all the work in this part of the mine. No. 4 stope, in the bottom of this level, will produce 2 tons of 25 per cent. ore per fathom: the tributers that were working here have given up, but we are working it on tutwork.—San Antonio Mine: A new shaft sinking from surface by six men; ground favourable.—Cuba Mine: We are again resuming work here, and are taking out some ore of 18 per cent. from a manto at the surface.—Santa Helena Mine: We have again resumed work here in the back of the adit level; the ground is very hard, and the stope will produce 1 ton of 30 per cent. ore per fathom. San Francisco Mine is suspended. I am glad to state that we are getting on very well with the building for the steam-engine; the loading for engine is completed, and we are now building the whim-cage stand. The boiler carriage was brought up to-day for the first time; it was loaded with long timber, and the iron tube stack for engine; it came on very well in this way. The animals will be accustomed to draw together, some 15 to 25 mules there, then when we bring up the boiler we shall not have so much trouble. I have reduced everything to the lowest point of working order until the machinery is ready, which I hope will be soon.

ELDORADO (Gold).—Dec. 18: The company's manager, under date Nov. 29, says:—There will be no return of gold this month, as we have only broken sufficient quartz from the shaft to keep the stamps going two or three days. The tunnel north has been extended a few feet, but no vein seen. The shaft on the Major Norton vein is 31 feet below the surface, the rock looks very promising indeed. From the continued wet weather the water increased so much that I was obliged to suspend the sinking till next summer. I have been offering rewards for the discovery of new veins. Navigation is closed with us for the season. Gold mining is very dull throughout the province.

EXCHEQUER (Gold and Silver).—L. Chalmers, Nov. 24: The north drift is in 171 ft. from cross-cut, and some fine stones of ore were taken out last week, gradually improving as we near the old winze. Six sets of timber inserted. Roche's stope is turning out some good ore, and shows a marked improvement in the hanging wall side. I am now hauling from this stope. The sump is cleaned out, and the second boiler tubes re-caulked, and again as good as new. Your boiler capacity is now ample. Enclosed I send you a letter I received from Professor Raymond, the United States Commissioner.

I. X. L. (Gold and Silver).—L. Chalmers, Nov. 24: I am not yet able to report on the face of the drive north from the 200, in the engine-shaft. The water was all out between Tuesday night and Wednesday morning week; the remainder of that week was occupied in cutting ground, and putting in timber for new pump station, and fixing the pump in its place. During the past week the cross-cut from the 200, which had caved in when the water was in the mine, was timbered, and the debris cleaned out. By Thursday we should get to the face, possibly on Wednesday, but the drive is much caved. I have already proved to the board that waste ore will pay if milled in your own mill. I have a good many tons (I cannot say how many) out on the dump from the old tunnel near the winze or shaft, between the two tunnels, and 270 ft. in from the mouth of the lower tunnel, part of which I have sent to the Exchequer Mill. Some beautiful specimens of ore came out during the week. The Ophir adit was driven 8 ft. by two men in two days, and a cross-cut made 6 ft. to tap the lode, which I find to be about 2 ft. 6 in. wide, composed of decomposed quartz and clay. So near the surface we cannot expect anything else. I have turned the adit a little to the left (west) so as to have the lode in the tunnel.

BENSBERG.—J. W. Hoffmann, Dec. 13: In the open-cast we have this week been getting carbonate from the north vein and from the level west of the open-cast, the latter at the same time producing good wash ore. We continued clearing fresh ground, but have not yet found carbonate; we expect to come upon it in going a little deeper. The north and south levels from the shaft are proceeding as quickly as the great flow of water will permit; the progress in both ends was 7 ft. each this week. The soft part which we met the week previously was only a pocket, and the ground is now as hard as ever it was. We commenced to-day making boring trials in the open-cast, at the east end, which has so far been very little explored. Next week I will report the results. Production of ore for the week—Carbonate, 40 tons, of 35 per cent. dressed ore; 15 tons of 47 per cent. assay. Delivered 20 tons of carbonate.

[For remainder of Foreign Mines, see to-day's Journal.]

CAMP FLOYD.—The mill of this company, says the *Utah Mining Gazette*, is producing bullion 994 fine. During the week several bars of such bullion were brought to the city. The ore worked was principally from the Sparrowhawk, Sunnyside, and other noted mines in the vicinity of the mill. The *Salt Lake Herald* adds that the produce of this mill for the week ending Nov. 16 was six bars, average fineness 995, and total value $7250. This lot was produced from ore from the Lion Hill Mine, east canyon. There are still about 200 tons at the mill, and ore is coming at the rate of 10 tons per day. Dame Rumour has it that some rock from the new workings of the Sparrowhawk Mine assays high in gold.

I. X. L.—We were in hopes to have been able to state the result of the strike in the north drift of the 200 ft. level, where the heavy body of water necessitated the suspension of work for a short time; but, on account of the miners refusing to work until the management of the boarding-house was changed, we cannot. There is very fine ore coming out of the old tunnel, and quite a quantity is on the dump waiting for the Exchequer teams.—Exchequer: In running for the old Buckeye ground from the engine-shaft, on Tuesday evening last, struck a very rich, though narrow, shoot of ruby and black sulphate of silver ore: this is thought to be the commencement of the rich shoot which was left before commencing to sink the engine-shaft. Ore is being hauled from this mine to the mill. On Wednesday last the Exchequer and I. X. L. miners struck for their stomach's sake; they were dissatisfied with the management of the boarding-house, but a change having been effected they resumed work. We trust they will be *captus inibre vulnæ*. Here is some Latin for the test of their digestive organs. Mr. R. H. Ford, of the Alpine House, has assumed the management of the Exchequer boarding-house, and all is again serene at the Exchequer and I. X. L. Mines.—*Alpine Chronicle, Nov. 22.*

JEWELLERY.—Mr. Streeter, of Conduit-street, has removed to 18, New Bond-street—a house for many years one of the most prominent in London for high-class jewellery. Mr. Streeter is already known as the introducer of 18-carat gold in jewellery, and as the originator of the crusade for reform in Hall marking. It is probably due to his efforts that a Bill has been announced as likely to be brought into Parliament to put an end to the frauds he has so warmly denounced.

BREAKFAST—EPPS'S COCOA—GRATEFUL AND COMFORTING.—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected cocoa, Mr. Epps has provided our breakfast tables with a delicately flavoured beverage which may save us many heavy doctors' bills."—*Civil Service Gazette.* Made simply with boiling water or milk. Each packet is labelled—"JAMES EPPS and Co., Homœopathic Chemists, London."

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MESSRS. WATSON BROTHERS return their most sincere thanks for the great patronage bestowed and confidence reposed in their firm for upwards of 30 years, and to assure their friends and clients it will be their earnest endeavour to merit a continuance of both.

In the year 1843, when Cornish mining was almost unknown to the general public, attention was first called to its advantages, when properly conducted, in the "Compendium of British Mining," commenced in 1837, and published in 1843, by Mr. J. Y. WATSON, F.G.S., author of "Gleanings among Mines and Miners," "Records of Ancient Mining," "Cornish Notes" (first series, 1862), "Cornish Notes" (second series, 1863), "The Progress of Mining," with Statistics of the Mining Interest, annually for 21 years, &c., &c. In the Compendium, published in 1843, Mr. WATSON was the first to recommend the system of a "division of small risks in several mines, ensuring the success in the aggregate," and Messrs. WATSON BROTHERS have always a selected list on hand. Perhaps at no former period in the annals of mining has there been more peculiar need of honest and experienced advice in regard to mines and sharedealing than there is at present; and, from the lengthened experience of Messrs. WATSON BROTHERS, they are emboldened to offer, thus publicly, their best services to all connected with the mining interest.

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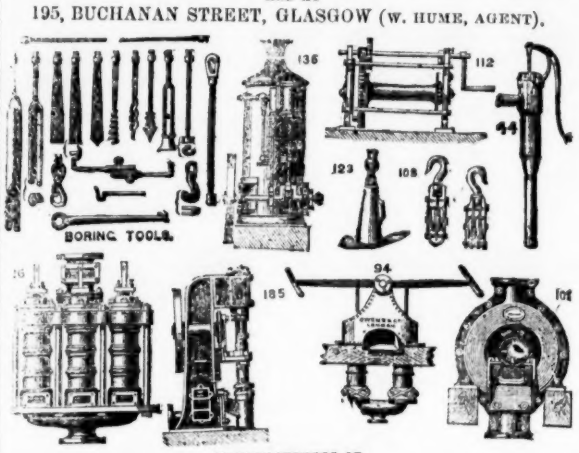

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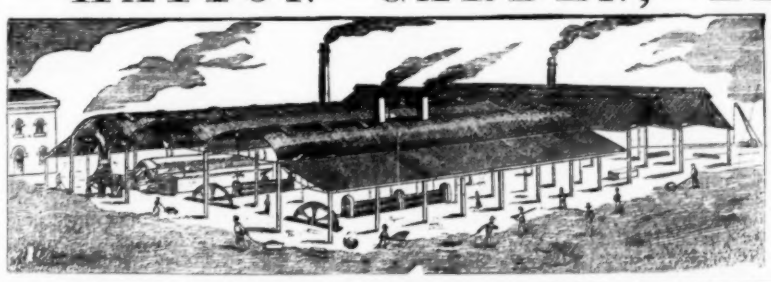
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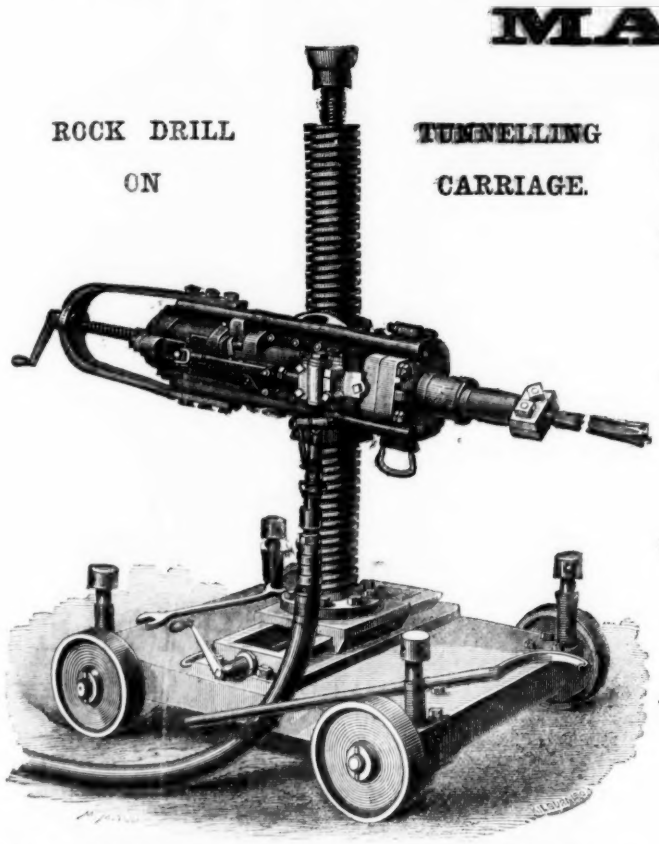

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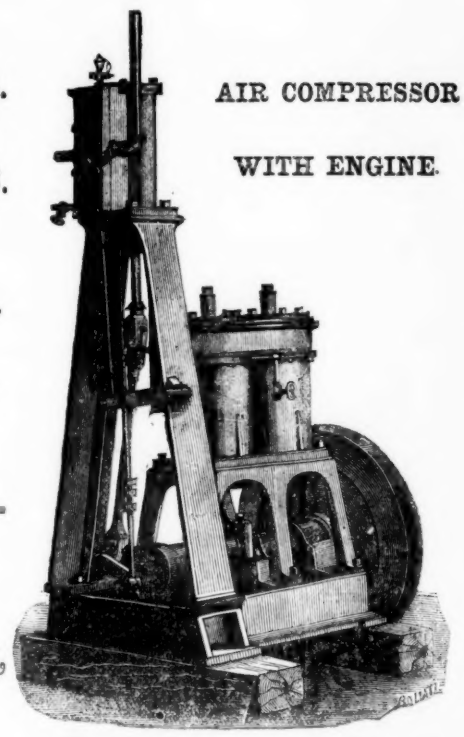

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Water Fillers, three, 12 days each, at 3s. 6d.	6 6 0
Blasting powder	1 2 0
Total	£47 0 0

Depth Sunk 3 yards—Cost per yard . . £15 13s. 4d.

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During a Fortnight.

Sinkers, three, 12 days each, at 5s. 9d.	£10 7 0
Labourers, six, 12 days each, at 3s. 6d.	12 12 0
Engine Stokers, two, 12 days each, at 2s. 6d.	3 0 0
Dynamite, 60 lbs., at 2s.	6 0 0
Electric Fuses (Brain's) 20 per day, at say 6d. each	6 0 0
Coal for Air Compressing Engine, 12 tons small, at 10s.	6 0 0
Oil for engines	0 5 0
Total	£44 4 0

Depth Sunk 5 yards—Cost per yard . . £8 16s. 9d.

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ADDITIONAL TESTIMONY.

(COPY.)

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I am, yours truly,

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(COPY.)

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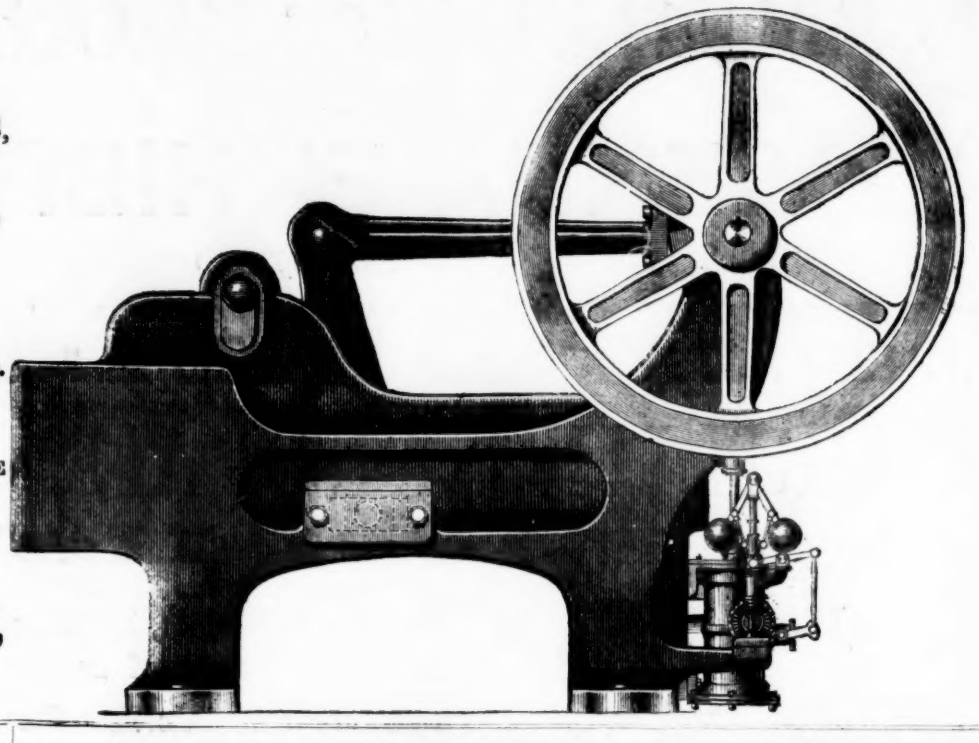

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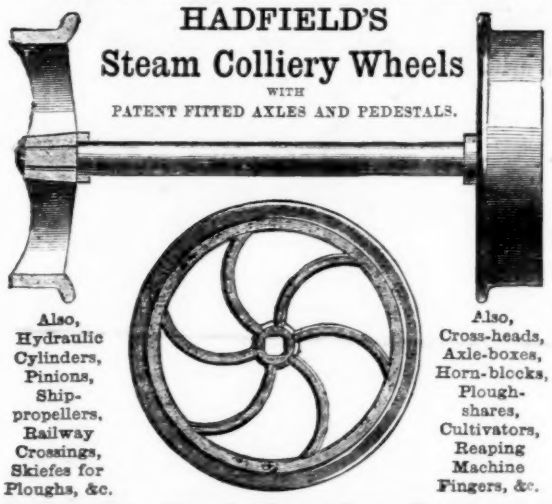

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